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PRODUCTION

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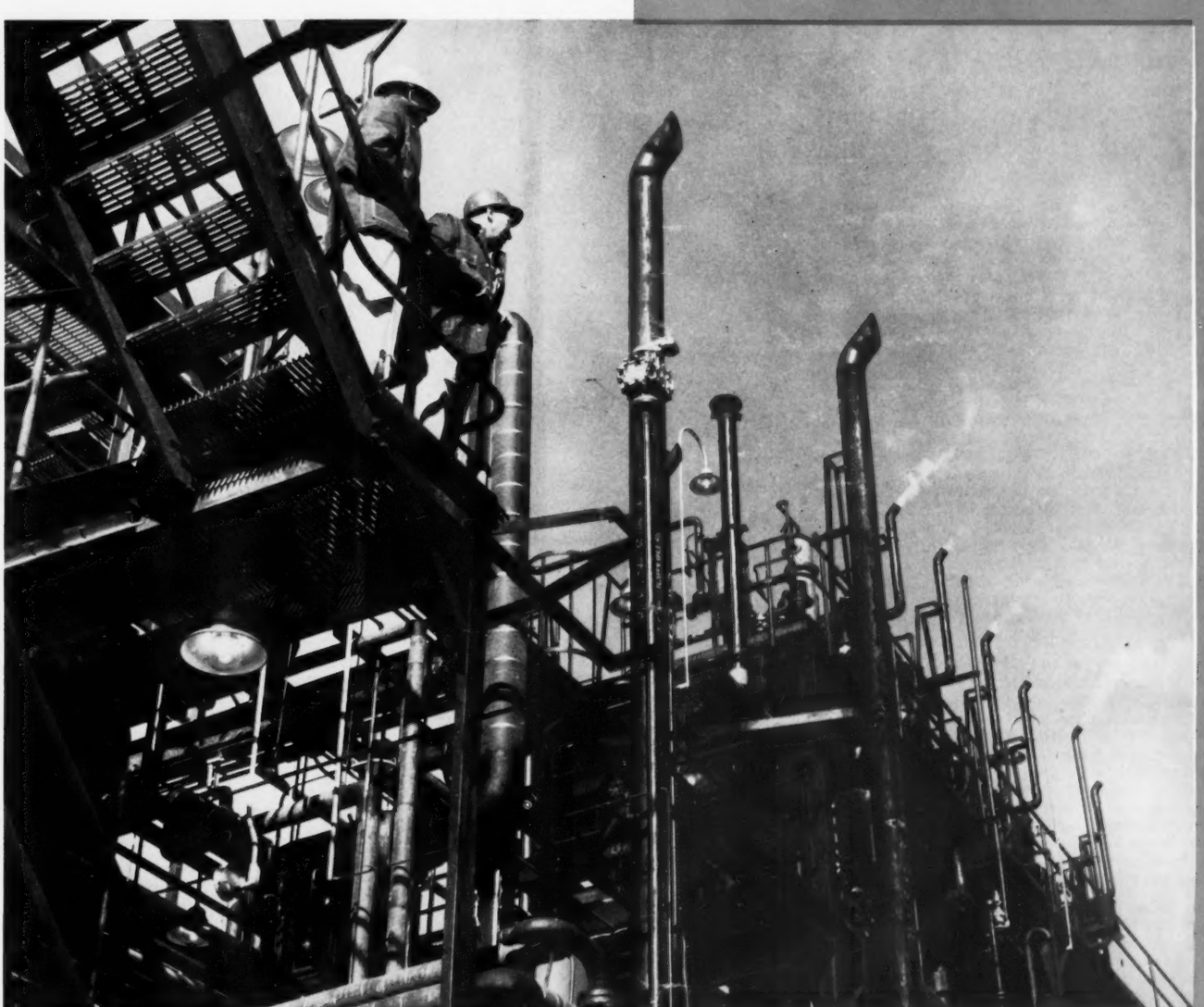

PESTICIDE PRODUCTION—Monsanto's parathion plant at Anniston, Ala., is surveyed by John Mullendore and Fritz Rosenberger, unit supervisor and project engineer, respectively. See story on page 21 this issue.

FEATURES THIS ISSUE:

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"GOOD HOUSEKEEPING" PRACTICAL . . .

Emphasis on Clean Work Areas Results in Greater Efficiency

By E. O. Burroughs, Jr.
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Norfolk, Va.

WHEN "housekeeping" is mentioned in connection with the operation of a fertilizer factory, usually the first reaction is to throw up one's hands and beller—"Who can keep a place clean with fertilizer material dust all over the place?"

This concept of housekeeping is associated with the housewife's job—just keeping the floor swept and the furniture dusted. But housekeeping at home is more than that. It is the orderly and efficient management of the household day and night without let-up.

Even this smaller concept of housekeeping has a place in the program of industries that deal in dust and dirt. Surely a foundry has as great a problem with dirt and dust as has a fertilizer factory. Yet, from its experience, a stove manufacturing company with a large foundry established a policy expressed in the following declarations:

1. That dirt is always an evidence of waste; either of material or of energy or of both.
2. That cleaning up a lot of dirt and disorder is a janitor's work but that preventing this disorder is management's job.
3. That if you can't manage to have order in your department, you can't manage your department.
4. That if you are working in dirt and disorder, your costs are higher than they should be.

On the broader aspects of housekeeping, I like the statement of another foundry man, a district manager of American Car & Foundry Co., at Berwick, Pa.:

"It is my opinion that general good housekeeping and appearances are an important factor in mental guidance of the worker. The appearance of the grounds and the internal factory area establish the frame of mind in which the workers approach their daily tasks. We believe that 'a good housekeeper is a good worker' and we can prove it."

Plant housekeeping is vitally related to three aspects of fertilizer operations:

1. Actual production
2. Maintenance and repairs
3. Capital protection

I am not going to deal in any theoretical or technical discussion—instead we are going to talk about practical, down-to-earth matters; things familiar to any observant individual around a fertilizer plant.

The screen level of a mill unit has an attendant to remove foreign matter that is screened from the fertilizer. If that man's job is properly attended to, he will see that the screen level is kept clean of accumulated dust and that debris removed from the screen is regularly removed to the proper place. This last he can do when he goes down to lunch or at the end of the work day. This will be done if the foreman is on the job and sees that it is done.

If the foreman doesn't look after this, instead there will soon be twelve to thirty bags of debris piled up around the edge of the platform against the guard rail, dust a foot deep over most of the platform and neat rows of spikes, bolts, nuts and what-have-you lined up on the top guard rail, just waiting to fall on men working on the lower level.

Under these and similar conditions at other locations in the plant, frequently the plant must be closed down and everyone put to work cleaning up what should have been kept clean while production was going on. This means added cost.

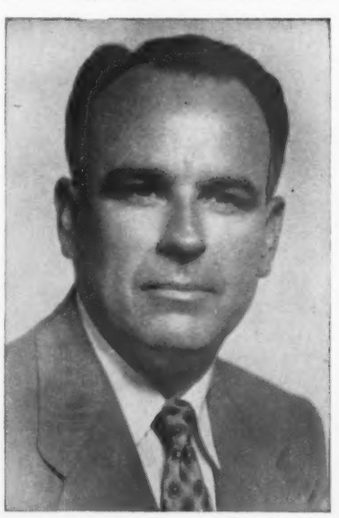
A few years ago I unexpectedly dropped in on one factory a day before the expected visit of the general superintendent. As I made the rounds that morning, housekeeping was at its worst. Trash barrels with as much overflowing as was in them, soft drink bottle boxes overflowing with bottles on the floor all around them, work platforms with fertilizer piled two feet deep at places, piles of splintered wood removed from the screening grill over hopper, etc.

The next morning when the general superintendent made his inspection tour, all was in apple-pie order. There was quite a difference in the two reports that went back to top management. There was also an unnecessary cost item as most of the plant personnel was taken off production for the full afternoon to clean up.

The loading dock and track area is the scene of much activity. Frequently car door straps and paper are removed from the cars and thrown on the dock along with the dock boards; debris from the cars is pushed out of the car doors and left on the ground between the tracks. That is the quickest and easiest way to dispose of it.

However, when it is necessary to load a car beyond this passage block, time is wasted when everyone has to stop until the dock area is cleared so the fertilizer can be trucked to the car beyond. Good housekeeping would have required this scrap and debris to be put in the proper place to begin with and time would not then have been lost in clearing the passageway.

Under such conditions, employees may stumble over this debris or step on an exposed nail. Even if no infection sets in there is one man out of the gang, while a trip is made to the doctor, probably at least one day's time is lost and all the reports must be made by the office to the insurance company, the industrial commission, the safety department and an investigation made by the foreman in charge.



E. O. Burroughs, Jr.

Or the train comes in for a shift and the brakeman stumbles and falls over a pile of the debris left on the track and, slipping under the wheel of the car, loses a leg. Sure! the railroad was supposed to have cleaned the cars out before they placed them at your plant but their failure to do so will not relieve you of the liability for the injury to the railroad employee caused by your negligence and carelessness. So there goes another cost to production.

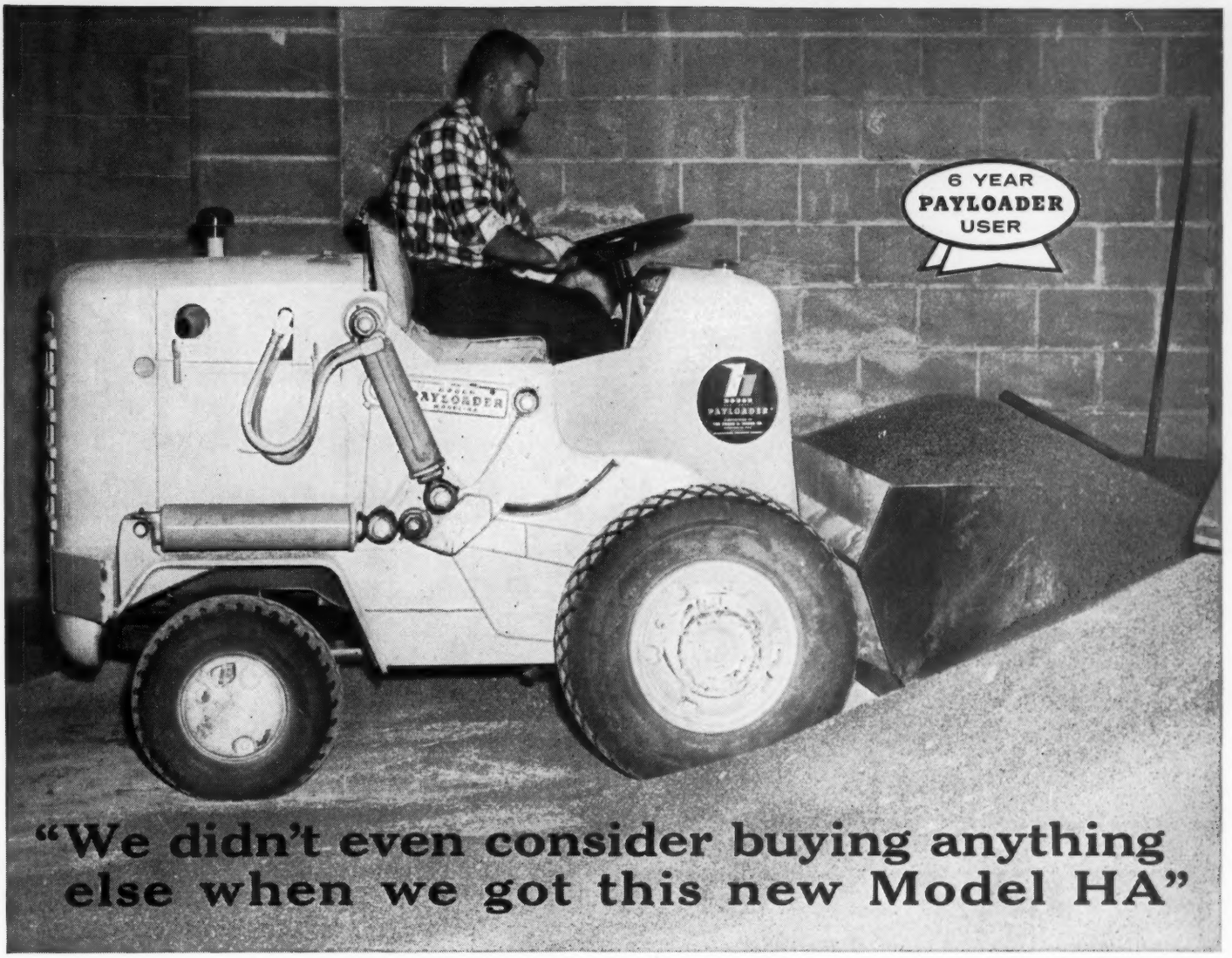
All this and many more equally as obvious bad housekeeping practices directly affect actual production costs and quality.

One of our far southern plants over the past 25 years has been outstanding in its safety record. Under the superintendent who has since retired and under his son who followed him as superintendent, the average lost time accident frequency has been less than 5 over the 25 year period. Does attention to clean and orderly working areas affect their production?

One day I was around that plant—things were clean when I arrived and just as clean at the close of the day—the superintendent announced that they had set a record for tonnage production. The job done right does not decrease production efficiency but increases it.

The heart of the maintenance program is the mechanical staff and their supply of repair parts. Something goes wrong at the head of the elevator of No. 3 Mill. Operations must cease until repairs are made. Can the mechanics be called and repair work proceed without delay or was the chain fall left last week at the head of elevator at No. 1 Mill, or was it at No. 4 Mill, or was it over in the Acid Department? Where is the file that is needed? Is it covered with dust and ruined nearby where it was last used? Do we know where the replacement gear is stored, or was it dumped over in the corner somewhere with various items, so that it will take quite a while even to find the location and then a longer time to move the tangle of other parts and get to it?

Are the tools that are going to



"We didn't even consider buying anything else when we got this new Model HA"

Continental Fertilizer Co. supplies farmers in the vicinity of Nevada, Iowa with custom-mixed and ready-to-use fertilizers of various types. For more than six years this firm used a Model HA "PAYLOADER" tractor-shovel to unload box cars of raw materials and move these ingredients from various bins for dry blending and liquid fertilizer preparations.

They traded the old one for a new Model HA "PAYLOADER" (2,000-lb. carry capacity) last August. "Because of the exceptional, reliable performance we had had we didn't even consider buying anything else," says Oliver Haley, President and Manager. "Fertilizer dusts are tough on equipment, just like emery cloth. Yet our old HA was used 16 to 20 hours non-stop during the busy season and, in 6 years, we never had the head off the engine . . . never gave it anything but normal care for brakes, points and plugs."

The same kind of performance and reliability is reported by chemical and fertilizer plants of every size on all sizes of "PAYLOADER" tractor-shovels from the model HA up to the big 4-wheel-drive 9,000-lb. carry capacity unit. There is a "PAYLOADER" model that can fit into your equipment plans too — that will help increase production and reduce bulk-material handling costs. Your nearby Hough Distributor is ready to give you the benefit of his extensive tractor-shovel knowledge and experience. Ask him about Hough Purchase and Lease Plans too.

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be needed in their place in the shop so they are available without searching at four or five other places? All of these aspects of the housekeeping problem affect the overall cost of maintenance and also affect cost of production as the production force remains idle while the repairs are being made.

Of course, we all recognize the need of guards around a moving belt or a moving piece of machinery within reach of the working area. So just to be proper, we throw a flimsy guard beside the drive pulley of the motor with 1x3 strips. One of these strips is broken and we repair it. Then another is broken and it stays broken longer but it is finally repaired. But it breaks again and this time the guard has to be removed to work on the motor. Well what's the use of putting it back anyway it stays broken all the time? So the maintenance staff just leaves the guard off and then we have an accident.

Let's take a look at that flimsy guard. It was insufficient to command the respect of the workers in the first place. It really wasn't put there to guard the machinery but just to satisfy the requirement of having some kind of guard around moving machinery. If a proper, substantial guard had been provided in the first place, the maintenance crew would have realized that there was a purpose in its use and there would have been no inclination to disregard replacing it after they had finished their work.

How about those old gears which were removed from the machinery at the elevator head or on some other upper level? There is quite a bit of vibration in the structure around machinery and if that gear or bolt jars to the edge of the platform and that toe-board hasn't been replaced it can cause serious damage when it falls below. No job is finished by the maintenance crew until all necessary new parts and guards have been put into place and worn-out equipment and parts have been removed to the proper place.

But how frequently we find that all that has been done is just the replacement of the old part with a new part and some of the tools removed, guards left down, old used parts left right where they were taken off and some of the tools left at location of repairs.

Of course, we have always heard that it is the exception which proves the rule and there are exceptions but by far most of the time the quality of a mechanic's work can be judged by the way in which he finishes the job and leaves the premises after the completion of the job.

There is no question about the interest of management in capital protection. In my state, the basic fire insurance premium rate on the type of plants commonly found in that area is 1½%. Even at this high rate, insurance companies are reluctant to take the risk and many plants cannot secure full insurance. Bad housekeeping can increase the fire hazard to the point that losses in the industry will continue to mount and rates go beyond all reason.

Such high rates are not necessary. Over the last 25 years with an average exposure of 20 frame plants, we have maintained a loss ratio of approximately .5%. A similar record for the industry would materially reduce the fire insurance rate.

In a recent pamphlet by the National Safety Council entitled "Be Fire Wise," electricity is called the number one cause of industrial fires. We look at a small irregularity in the electrical system and think it just couldn't cause any serious damage, therefore, we pass it up for attention sometime in the future. We under-estimate the potentiality of the hazard.

Just look at that extension cord over by the elevator casing. The glare by the scale was too much as it originally hung, but it is much better over back of the operator hanging against the elevator casing. It's just a 100 watt or 200 watt bulb, 110 volts, it can't cause any trouble. But I have personally seen dozens and dozens of spots 3 inches to 4 inches in diameter charred to the depth of ¼ inch to ½ inch where such "harmless" bulbs hung. Any one of those spots under the proper atmospheric conditions could have caused a fire which would have destroyed the plant. Several have started fires which were noticed in time to prevent serious damage.

Look at that light in the weighers' booth. It was run from the panel box on the post over to the top of the booth and realizing that the cord should not be suspended through a hole bored through the top of the booth it was suspended instead through a short section of pipe inserted in a hole in the roof to keep the wires from direct contact with the combustible wood. There is a lot of vibration and the rough edge of the pipe, without an entrance head, can quickly wear down the installation to the point that a dead short might develop, but continuous arcing might begin between the two wires.

Don't underestimate the heat which can be given off under such circumstances and the fire hazard that is created. Even if the pipe section is long enough to dissipate the heat before it reaches the wood board through which the pipe passes, the insulation on the wire can catch fire and from this combustible material can be ignited.

During the war years, and since,

Turn to **HOUSEKEEPING** page 22

Variations in Product's Density Add to Problems Of Packaging Fertilizers

By W. F. Jacobi
Union Bag-Camp Paper Corp.
New York

THE TRANSITION from semi-automatic weighing and bagging of fertilizer to fully automatic cycling and preweighing has focused attention on problems that were previously considered unimportant.

One such problem is the need to pay greater attention to the maintenance of automatic weighing and bagging machines. These are precision machines. Consequently, any mechanical defect which interrupts the timing sequence of dribble gates, weigh hoppers, etc., causes a variation in the weights of individual bags.

Another problem is one always inherent in the weighing of free flowing materials. It becomes pronounced, however, when weighing moves from a manual to an automatic operation. This concerns variation in the densities of the materials being weighed. Suppose, for example, one had to automatically weigh a certain material weighing around 60 lb. per cubic foot. Its density, however, varies from 58 to 61 lb. per cubic foot. This variation naturally would reflect itself in the weight of each individual bag.

Back in the era of cracker barrel stores, the grocer had a system that he used which compensated for average variations in density. In those days sugar came in barrels. The grocer weighed out the sugar into different size bags, depending on the customer's requirements. In weighing the sugar he used a dial scale which had a flat platform.

He placed the bag on this platform. Then he dipped a hand scoop into the sugar barrel and poured the filled scoop into the bag until it reached within a few ounces of the desired weight. The grocer then dribbled the remainder of the sugar into the bag by shaking the scoop until the filled bag reached the desired weight. Despite any variation in densities of the sugar, the weights were accurate if his scale was properly adjusted.

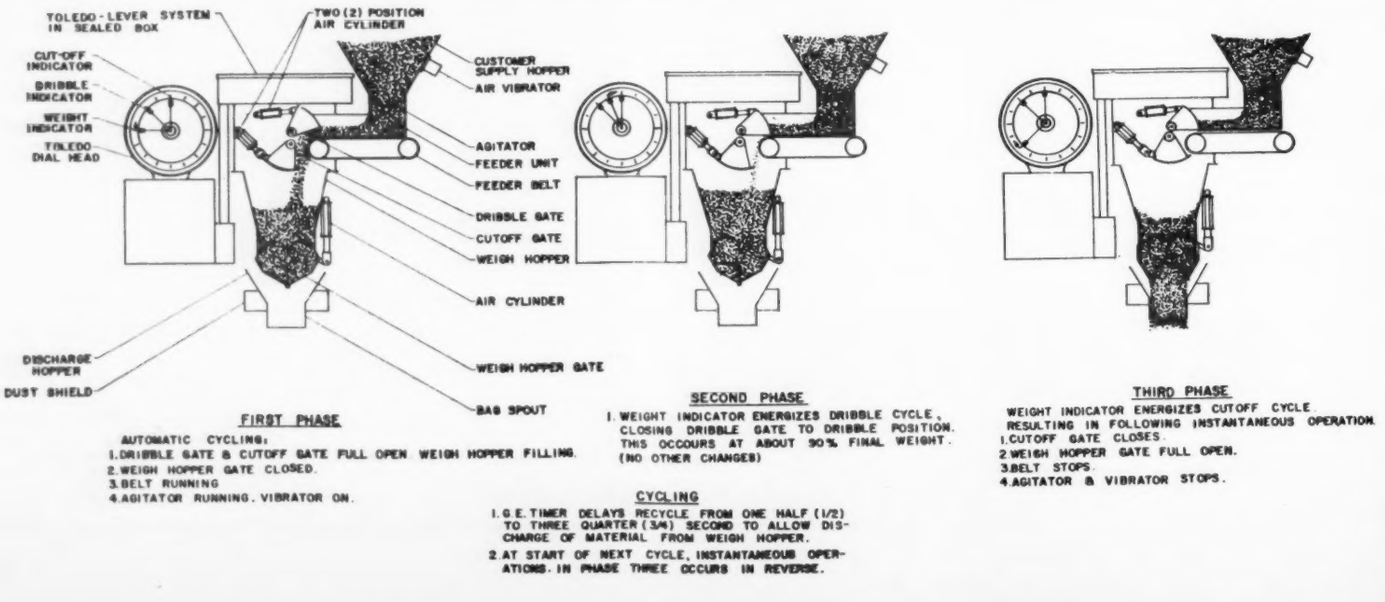
In our efforts to devise high speed automatic weighing for granular materials we experimented with many methods, both old and new. The results of these experiments led back to the basic operation described above. In essence, control of density variation is accomplished by repeating automatically and mechanically the same functions performed by the old fashioned grocer.

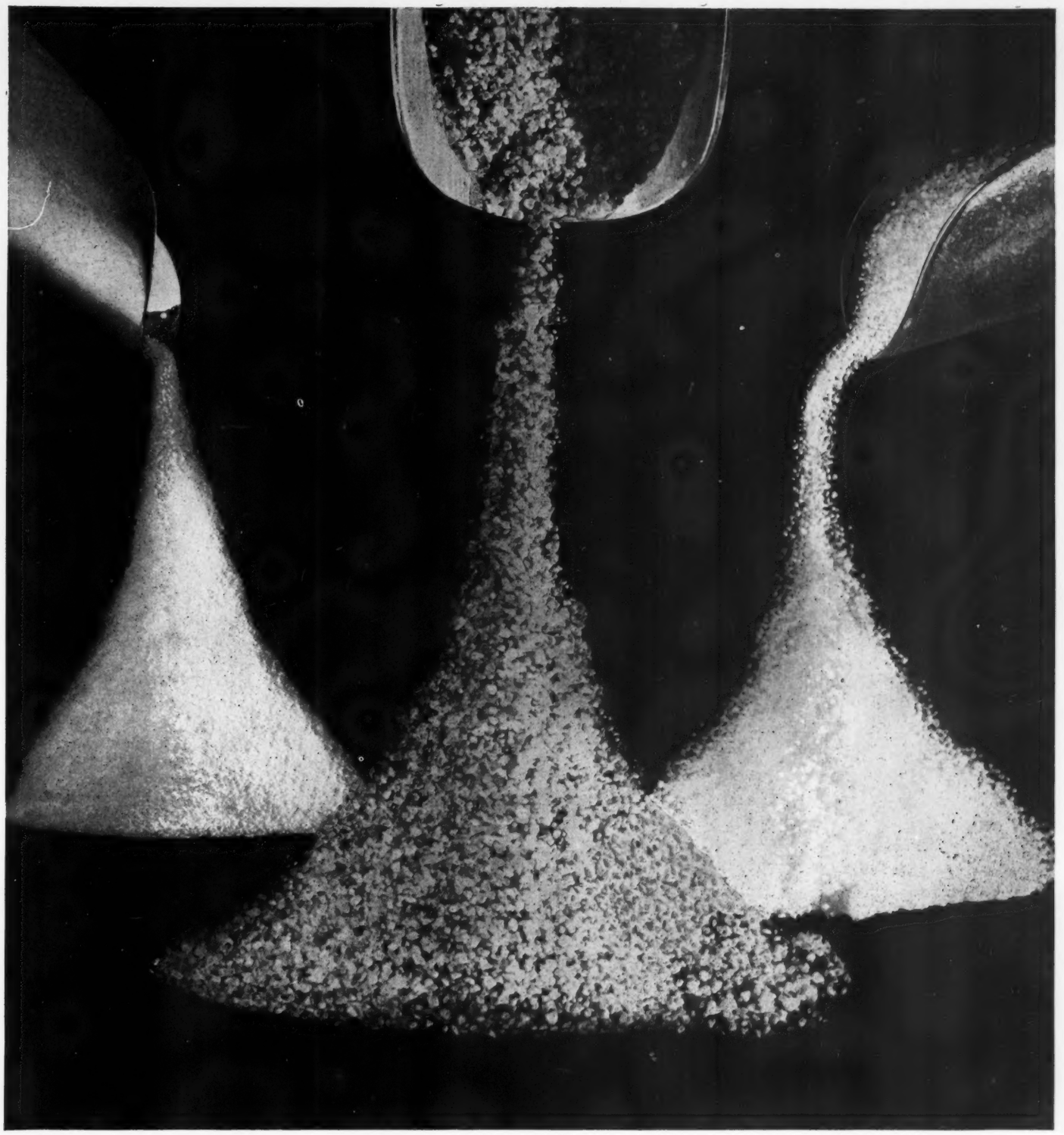
The diagram accompanying this article depicts the dial head used and the three cycles: bulk cycle, dribble cycle, cut-off cycle. The bulk cycle commences when the machine is put into operation. The material flows over the belt into the weigh hopper until the weight is within a few pounds of the desired weigh unit. The dribble cycle then goes into effect, automatically compensating for density variations, and chops off when the unit weight desired is reached (allowance, of course, is made for the fall over involved).

While this explanation of the system used may be over-simplified, the system itself is indeed quite simple. It only becomes complicated when attempting to explain the electrical and pneumatic systems which mechanically accomplish the bulk, dribble and cut-off systems.

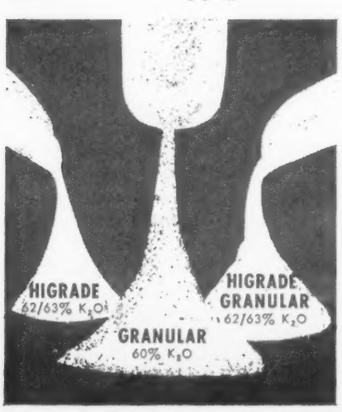
The systems just described are extremely accurate. When densities vary greatly, however, the variations will reflect in the unit weights. No automatic weighing machine can wholly compensate for poorly controlled production of the product without reducing the product flow in the dribble cycle. After a certain point this makes the operation unfeasible from the production rate standpoint. It must be remembered that a scale, no matter how accurate, will only indicate what it is given to weigh. Attention, therefore, must be given to the production processing in order to hold density variations to a minimum.

DENSITY PROBLEMS—Illustrations below illustrate points made in article on how materials are "dribbled" into hopper to avoid underweight or overweight filling. This type of filling overcomes difficulties encountered because of varying densities in materials being handled, author says.





Better fertilizers begin with three grades of free-flowing USP potash



USP offers *three* outstanding grades of potash to meet the most exacting requirements of modern fertilizer production: two white grades—Higrade muriate and Higrade Granular muriate—each containing 62/63% K_2O give you more potash per ton than any other type of muriate. And USP's Granular muriate, containing 60% K_2O, is preferred where a still larger particle size is required.

All three grades are specially refined to remain free-flowing and resist caking for easier handling, manufacture and application.

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PRODUCTION IN INDIA . . .

Formulation Problems Solved; DDT Unit Now Operates at Capacity

A DDT FORMULATING PLANT, that of Hindustan Insecticides Private, Ltd., Alwaye, South India, has overcome a number of unusual obstacles to reach its production potential. One of the basic problems was the necessity of utilizing a maximum amount of formulating materials of indigenous origin, or those natural to India. This problem had presented itself earlier in the government insecticide plant at New Delhi (built in conjunction with UNICEF and the World Health Organization.)

Thus, before equipment could be specified for the new plant, certain types of indigenous clay were sent to the U.S. for experimentation. The Sturtevant Mill Co., Dorchester, Mass., made tests on Indian inert materials through its fluid energy grinding mill, and because of the promising results, Sturtevant was subcontracted to engineer the formulating plant equipment when initial plans were being made late in 1957. Basic contractor was Singmaster & Breyer, Inc., New York.

H. G. Felio, foreign manager of Singmaster & Breyer, directly supervised the erection and operation of the plant in cooperation with S. S. Jaggia, managing director of Hindustan Industries. Mr. Felio describes the workings of the new plant and outlines some of the early problems encountered.

"The first operation of the new plant was that of grinding large cast slabs of unadulterated DDT which has a set point of 90° C. and is basically a sticky and tacky material which tends to agglomerate or melt under grinding pressures and temperatures," he reports. "Aging permits further crystal growth and the consolidation of impurities at crystal interstices, thus alleviating these problems to some extent.

"However, despite the difficulties of grinding 'green' DDT, the primary grinding mill, in conjunction with its conveyor belt and shroud, grinds successfully DDT material which has been aged hardly two days. From this preliminary grinding, the technical-grade DDT is fed into the boot of an elevator and, with the necessary diluent and detergents, is further fed into a ribbon blender for thorough dispersing.

"From the blender, it is conveyed through a rotary mechanical valve to a grinder, where lumps are broken and further dispersement of this diluent material is effected. A hopper then receives the material and turn, screw-feeds it into the high-velocity rotating air stream of the Sturtevant Micronizer where the interaction of the particles themselves accomplishes the final grinding.

"The micronizer works on the principle of super-speed rotation of particles produced by tangential jets of compressed air, which causes violent interactive impact of the particles, resulting in fine pulverization without attritional heat. The product uniformity is maintained in the desired size range. While fines are collected and classified in the center of the grinding chamber, centrifugal force tends to keep coarser particles in the grinding zone until they are sufficiently reduced to move inward to the point of discharge.

"The material is continuously dis-

FORMULATING DDT IN INDIA—Native worker gathers slabs of cast DDT (photo at left) preparatory to formulation of the material. Aging of "green" DDT alleviates agglomeration and melting difficulties common with pure technical product. At right is DDT plant of Hindustan Insecticides Private Ltd. at Alwaye, South India. Plant is operated with American-made (Sturtevant) micronizer and other modern formulation equipment.

charged from the jet mill and is carried by the exhaust air stream through a large reinforced rubber hose which discharges into a combined cyclone and self-cleaning bag-type collector. From the cyclone, the material is discharged through a motorized rotary valve to a gyro sifter and then to a rotary blender and a final drum filler. The drums are positioned on a pneumatic jolter.

"The entire system is operated under negative pressure accomplished by a large suction blower and all dust discharges into the cyclone and bag. The cyclone unit has been extremely efficient in that there is absolutely no formulated material in the air discharge. This means that it is a completely dustless operation, usually a major concern in DDT formulating plants.

"The formulation of wettable powders has been more an art than a science and in a number of instances, months of trial and error in technique and formulation are necessary before success is attained. It seems worthy of note that through the joint efforts of Singmaster & Breyer, Sturtevant, and Hindustan Insecticides, the plant at Alwaye produced—on its second test run—50% wettable powder formulated DDT entirely acceptable to WHO and the Indian Standards Institute.

"This accomplishment, we believe, is unique in the industry. WHO specs usually are extremely difficult to adhere to in that a variation of slightly more than 1% in weighing the charged materials can result in total rejection of the end product since the suspensibility, dispersibility and tropical test procedures are affected.

"The formula adopted for the 50% formulation used almost exclusively a local china clay as a diluent. Only approximately 5% was synthetic diluent. The actual formula used:

50% Formulation

DDT	50%
China Clay (India)	40%
Microcel	5%
Polyfon	2.5%
Fenofon	2.5%
	100%

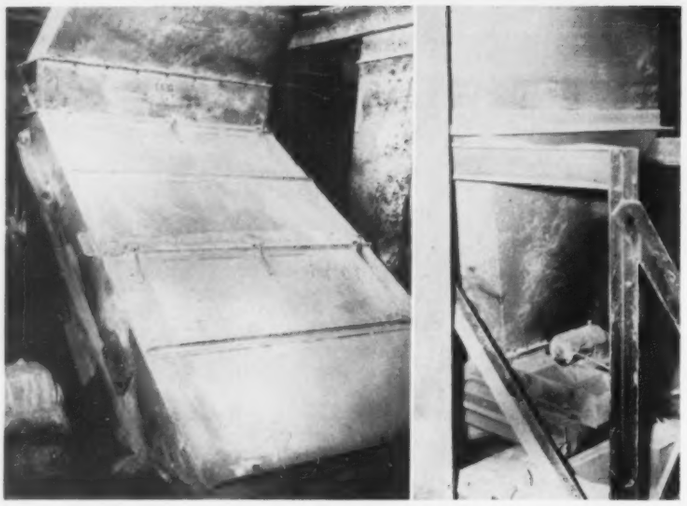
"Experimentation on this 50% formulation continues. These figures are those of the second test run. Continued testing is expected to result in a definite reduction in imported materials.

"The 75% formulation was as satisfactory as the 50% in that it too produced an acceptable product on only the second formulation. The formula adopted for that run and still being used at Alwaye is:

75% Formulation

DDT	75%
Microcel	15%
Polyfon	2.50%
Fenofon	2.25%
China Clay (India)	5.25%
	100%

"India's desire to increase DDT capacity has been realized by the new Alwaye plant which is operating above expectations in both its formulating and DDT units."



NEW JERSEY OPERATION . . .

Efficient Output

PRODUCTION EQUIPMENT—Inside the Dayton plant are these devices for adding to manufacturing efficiency. At left are vibrating screens through which fertilizer ingredients pass en route to one-ton mixer. Oversize particles are recycled. At right is hopper which brings mixed material to bagging department of plant.

APPROXIMATELY 100 tons of fertilizer is produced daily at the Dayton Fertilizer Corp. in Dayton, N.J., just out of New Brunswick. The major portion of the plant food is of standard formulations for use on potatoes, tomatoes, grain and hay crops, but special requirements are met with regularity. Extensive experiments with ingredients, their proportions and their effects are also conducted in conjunction with other research programs in the state.

Dayton employs a closed circuit method of formulation of fertilizers, engineered for the five-year-old firm at its inception by Sturtevant Mill Co. of Boston, Mass. Because of its closed-circuit operations, from introduction of fertilizer ingredients to the bagging of the finished plant food, special formulations do not present unusual problems. William Nist, Dayton vice president, says this method is "best for special formulations," and considers it one of the main advantages of the system.

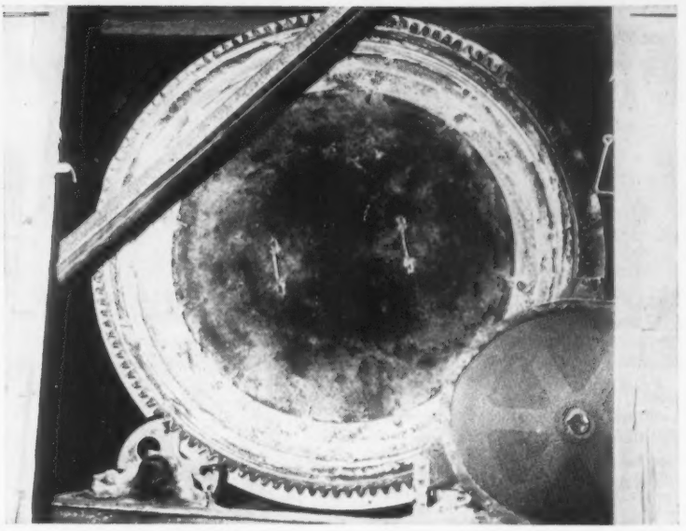
As an example, when a local farmer wishes to include minor elements or an insecticide in his fertilizer, the special ingredient is introduced at the hopper with other ingredients, carried by elevator to and through vibrating screens, to the mixer or pulverizer to the bagger, or directly to the bagging unit if he so wishes, via a second bucket elevator. When the special formula is completed, the operator may switch back to routine operations without delay.

Normally, the various ingredients are dumped, a ton at a time, into a receiving hopper, passed through chain-driven breaker feeder to a bucket elevator. From this point, they are conveyed to five-horsepower vibrating screens. Fertilizer which passes through is charged into a one-ton mixer, wherein four-way mixing actions—vertical, circular and two lateral—blend the ingredients. Particles too large to pass through the screens into the mixer are diverted to a rotary pulverizer which reduces their size and re-directs them to the bucket elevator for conveyance, once again, through the screens and thence to the mixer.

During this blending operation, ammonia is added and the ingredients are cascaded in a 180° arc by revolving buckets and forced from one end of the blending drum to another, giving the four mixing actions. The product is then discharged into a second bucket elevator which conveys the material to a curing pile.

Once cured, the fertilizer is later dumped into the receiving hopper, through the breaker feeder, then conveyed by the bucket elevator to the screens and pulverizer to reduce the oversize particles caused by normal caking. This time, the material bypasses the mixer, going directly to the

Stressed at Plant



MIXER—At right is Sturtevant mixer on which Dayton plant depends for manufacturing various analyses of fertilizers for its customers. The latched door on the mixer permits rapid access to all movable and replaceable parts of the rotating drum.

second bucket elevator which carries the fertilizer to the bagging hopper.

The cured fertilizer not passing through the screens is diverted to the rotary pulverizer and recycled.

Plant processes were developed by Sturtevant, except the batch weighing devices by Kraft.

According to L. H. Edwards, plant manager: "It's better when you don't have to clean or bother too much with the equipment. In the corrosive environment of a fertilizer plant, once you begin removing corrosive deposits from the equipment, you expose the fresh metal to more corrosive activity and, in turn, lessen its over-all life. However, our equipment is sturdy and is going to last for a long time, despite the corrosive challenge it faces."

Performance has backed up what Mr. Edwards says. In the past five years of operations, chain and buckets on the No. 2 elevator which conveys highly-corrosive ammoniated material, have needed only intermittent replacement.

On the other hand, he says, no parts replacement has been necessary on elevator No. 1, which conveys the raw material into process and later takes the cured fertilizer to the screens and pulverizer for breaking up prior to bagging operations.

Screen cloths are replaced about once a year, Mr. Edwards reports. He considers this a minimal maintenance

(Turn to **PLANT**, page 27)

Factors in Choosing Potash for Making Liquid Fertilizer Mixes

AT LEAST five physical properties are of importance in potash for use in the manufacture of liquid fertilizers. These include:

- **Solubility**
- **Purity minimum of insoluble impurities**
- **Compatibility with other materials used in the process**
- **Readily available and reliable source of supply**
- **Ease of storage and handling**

In addition to the physical properties is this most important economic consideration: The low cost per unit of plant food.

A large number of available potassium chemicals meet one or more of these qualifications. Among these are potassium carbonate, potassium sulfate, potassium nitrate, potassium phosphates, potassium hydroxide and potassium chloride or muriate of potash. Of these, potassium chloride has become the most popular for this application. It is sufficiently soluble and compatible with other ingredients under most conditions. It is available in a sufficiently pure form which may be easily and safely handled and stored in the plant with the use of conventional materials handling equipment. Most important, it is the least expensive form of fertilizer potash available, since it is the basic raw material source of potassium for the manufacture of other potassium chemicals.

Muriate of potash is available in technical and agricultural grades, which vary in chemical composition, physical properties, and price.

The highest purity muriate of potash is sold as chemical or technical grade potassium chloride. Because of its extreme purity (99.9% KCl) and the operations involved in obtaining this high degree of purity, it commands a premium price over agricultural muriates. The largest portion of chemical grade potassium chloride is used in electrolytic processes in the production of caustic potash. For this use, it must be extremely pure and devoid of conditioning agents which may be harmful to the process operation or products produced.

Since potassium chloride for this use cannot be conditioned to guard against caking, it can, under certain conditions of temperature and humidity, cake during transport and storage. Caking may lead to difficulties in car unloading and handling in the fertilizer plant, adding to labor and expense in plant operation. For these reasons, untreated chemical grade potassium chloride is not widely used in liquid fertilizer manufacture.

Agricultural muriates of potash may also differ in regard to chemical analysis and physical form, depending principally on the method used in winning the potash from the ore and the method of processing the potassium chloride into its finished form. As you know, the major portion of our domestic muriate of potash is mined near Carlsbad, New Mexico. The raw ore which is mined is essentially a physical mixture of sodium and potassium chlorides and the problem resolves itself into separating the potash from the salt. Fortunately, these two constituents (sodium and potassium chloride) have sufficiently different properties which may be used as a basis of their separation.

Differences in specific gravities of sodium chloride and potassium chloride permit a separation of these components by flotation processes. Products from these processes contain about 95% KCl and are generally red in color reflecting the presence of insoluble impurities which make such materials unsuitable for use in liquid fertilizers. Differences in solubility characteristics of sodium and potassium chlorides allow for a separation by solution and recrystallization mechanisms.

A recrystallized agricultural muriate of potash is available which is white in color and contains about 99% KCl or 62/63% K_2O. The absence of insoluble impurities, removed during the recrystallization process, makes this material ideally suitable for use in liquid mixtures. It is specially treated to render it non-caking and free-flowing during shipment and storage. Recrystallized agricultural muriate of potash is available in two general particle size ranges: A so-called standard or finely divided muriate, and a granular or coarser particle size material. Because rate of solution increases with decreasing particle size, the finely divided or standard form is generally preferred for use in liq-

By Dr. Edwin C. Kapusta*
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United States Borax & Chemical Corp.
New York

uid fertilizer manufacture. It should be noted that the granular or coarse materials command a slight premium in price over the standard size muriates.

Agricultural muriate of potash is shipped in bulk and bagged forms. Bulk shipments are made in 40 ton minimum box or hopper bottom cars. Bagged shipments are packaged in 100 lb. kraft paper bags. The form of shipment will, of course, vary with the facilities available for unloading and storage at the fertilizer plant. In plants with facilities for bulk storage the material should be stored in a readily accessible, dry, clean area free from possible sources of contamination. Properly conditioned agricultural muriate of potash will remain free-flowing and non-caking even after prolonged storage in bulk or bagged forms. Bagged muriate of potash is, of course, less susceptible to contamination than bulk material.

Bulk muriate of potash is easily handled by conventional materials handling equipment. It is usually unloaded and transported in the plant by means of payloaders. It may be weighed batchwise on ordinary platform scales or continuously by gravimetric feeders. Delivery to the mixing tank is usually accomplished by means of conveyor belts. In some cases the desired quantity of muriate is delivered to the mixer by means of an auger type screw conveyor. Muriate of potash poses no particular problems in regard to storage or handling; and presents no safety hazards to plant personnel.

In normal practice in the acid neutralization process for making liquid fertilizers, the usual order of addition of components in the manufacture of liquid mixed fertilizers is (a) Water (b) Phosphoric Acid (c) Source of nitrogen; anhydrous, aqua, or nitrogen solution (d) Potassium chloride and supplemental sources of solid nitrogen; urea or ammonium nitrate.

Potassium chloride has a negative heat of solution; that is, it absorbs heat when it is dissolved in water, causing the temperature of solution to drop below that of the original solution. In a pilot plant test of the manufacture of 6-18-6, the neutralization of acid with ammonia resulted in a boiling solution of ammonium phosphates. The addition of the desired quantity of muriate of potash reduced the temperature of the solution to approximately 160° F. This illustrates the cooling effect noted when potassium chloride is added to the ammonium phosphate solution.

Solid ammonium nitrate or urea added to provide supplemental nitrogen in liquid fertilizers also produces a cooling effect since both materials absorb heat on solution in water. Urea absorbs slightly more heat per unit of plant food than potash. On the same basis, ammonium nitrate absorbs about twice as much heat as potassium chloride.

The inclusion of muriate of potash has little effect on the pH of the fertilizer solution; but does increase the density of the liquid mixture. An 8-24-0 has a pH of 6.6 and a density of 10.5 lb. a gallon at 60° F. A 6-18-6 has a pH of 6.6 and density of 10.6 lb. a gallon.

* From paper presented before Pacific Northwest Plant Food Assn., Gearhart, Ore., October, 1958.

Plant food content is one of the most important considerations in the manufacture of mixed fertilizers, either liquid or solid. The advantages of high plant food content, or analysis, are quite obvious. In the production of liquid mixtures, plant food content is limited by the solubility of the materials used to make the mixture.

Since solubility varies with temperature, liquid fertilizers should be formulated to preclude crystallization or salting-out of solid components at the lowest temperature which might be encountered during the storage and/or handling of the liquid mixture. Thus solubility-temperature relationships will dictate the grades and types of liquid fertilizers which may be manufactured and marketed during various seasons of the year. In some regions, depending on the season, liquid mixtures should be able to tolerate a temperature of below freezing, without salting out to be acceptable.

"Salting out" or crystallization of solids from a solution is one of the major considerations of a liquid fertilizer manufacturer. The settling out of solids in the bottom of tank or container not only results in lowering of the analysis of the remaining solution, but presents additional problems in re-dissolving the precipitated solids. New and untried liquid fertilizer formulations should be pretested in the laboratory since it is impossible to predict the mutual solubility of various mixtures of plant food materials.

In discussing the effect of potassium chloride inclusion on the analysis of liquid fertilizer mixture, consideration should be given to its solubility limitations in neutral ammonium phosphate solutions and to its reaction with supplemental sources of nitrogen which may influence the salting out temperature of the liquid fertilizer.

Ammonium phosphate (8-24-0) solution made by neutralizing phosphoric acid with ammonia has a salting out temperature of approximately 20° F. The crystalline phase which salts out at this temperature is diammonium phosphate. In a 6-18-6 grade, made by the addition of potassium chloride, the solution has a salting out temperature of about 8° F.; again, the crystalline phase is diammonium phosphate. A 3-9-9 made by adding muriate of potash to an ammonium phosphate solution will salt out KCl at about 5° F.

In making liquid fertilizers with nitrogen to P_2O_5 ratio greater than 1 to 3, a source of supplemental nitrogen must be employed. Solubility characteristics, availability and favorable costs generally dictate the use of ammonium nitrate or urea, or combinations of the two, as principal sources of supplemental nitro-

gen for use in liquid fertilizers. These materials may be used as solids or in solution form. Urea is generally the more preferable material. It has a high solubility and does not react with other ingredients of the mixture, including potassium chloride, to give less soluble products. Ammonium nitrate, although also highly soluble, reacts with potassium chloride to form potassium nitrate which has relatively low solubility.

The use of urea in three component mixed fertilizers will generally permit the production of grades containing several units more of plant food than the use of ammonium nitrate in grades of comparable ratios. Studies of saturation temperatures, the lowest temperature at which the fertilizer solution will contain no solids under any conditions, of various mixtures made with varying quantities of urea and ammonium nitrate supplying the supplemental nitrogen, have indicated that specific mixtures of ammonium nitrate and urea have in some cases provided lower salting out temperatures than the use of either ammonium nitrate or urea as the sole source of supplemental nitrogen(1).

In summary, higher purity agricultural muriate of potash has proven to be a most suitable source of potash for use in liquid fertilizers. It is the least expensive form of fertilizer potash available and may be easily and safely handled in the plant. Like other materials used in liquid fertilizers, it does present certain solubility limitations on grades of fertilizers which can be made. These limitations will be dependent to a large degree on the source of supplemental nitrogen used in making the product.

LITERATURE CITED

(1) ..... Sohio Nitrogen Solutions for Liquid Fertilizer Manufacture. Sohio Chemical Company, Lima, Ohio, 1958.

PERMANENT TROPHY FOR CORONET—Coronet Phosphate Div. of Smith-Douglass Co. recently received for the third successive year, the Ralph B. Douglass safety trophy. Twelve Smith-Douglass plants in various sections of the country compete for the traveling award which is presented each year to the operation with the best safety record. By having won the trophy for three consecutive years, Coronet is now entitled to keep it on a permanent basis. Above are J. A. Monroe, left, Smith-Douglass operations vice president, and R. M. Wilbur, general manager of the Coronet Phosphate division.

Problems of Maintenance And Replacement Policy Not Easily Solved

"The problem of achieving a sound program of equipment maintenance and replacement policy requires the establishment of a systematic means for continually evaluating various courses of action. The purpose of replacement policy is to tell whether goods not yet physically exhausted have outlived their economic usefulness. In the broadest sense, replacement policy and maintenance policy are both investments, and the study of the economics of various courses of action may be likened to the study of various alternative investments.

"With the collection of necessary information properly organized, an analytical method of simply determining the relative merits of various proposals is available. Final decisions in all cases must give weight to not only the determinable factors which can be reduced to mathematical terms, but to the remaining factors which are called irreducible factors.

"The hoped-for objectives of maintenance and equipment replacement policy include prevention of breakdowns, prevention of unnecessary wear and damage to equipment because of neglect, attainment of maximum economic useful life of equipment, preservation of safety, and the attainment of lowest possible total operating cost.

"Adequate equipment records must be kept so that all repair information is immediately and accurately available. A continuing study of maintenance and replacement policy will grow in value as records become available."—Robert E. Robinson, Atlanta Utility Works, East Point, Ga.

What's Your Problem?

"The mere formulation of a problem is far more often essential than its solution, which may be merely a matter of mathematical or experimental skill. To raise new questions, new possibilities, to regard old problems from a new angle require creative imagination and mark real advances in science."—Albert Einstein.

Arcadian® News

Volume 4 | For Manufacturers of Mixed Fertilizers | Number 2

FERTILIZER SALES OUTLOOK IS PROMISING FOR 1959!

Survey Reveals Widespread Optimism

Many signs point to a promising year for fertilizer sales in 1959. To determine the market potential for the coming year, Nitrogen Division recently surveyed opinions of fertilizer men across the country. If weather conditions are normal or better, fertilizer men everywhere agree most factors indicate a good fertilizer year ahead.

Acreages of major crops are expected to increase, it was pointed out in a large number of interviews. Corn acreage probably will rise from 74.4 million acres in 1958 to 77 or 78 million acres in 1959. Cotton acreage will be upped from 11.9 million to approximately 17 million acres. Planted acreage of winter wheat exceeds last year by a million.

Although the Conservation Reserve probably will increase by about 12 million acres, the end of the Soil Bank's acreage reserve will release more than 17 million acres. This will mean a net of about 5 million acres more in production in 1959 over 1958.

Farm Income Good

Farm Income as a whole has been good this past year, which means farm finances now are in better shape.

Production costs on the farm have continued to increase, but fertilizer costs have not. Fertilizer prices have remained constant to slightly lower, and industry leaders agree this should lead to increased fertilizer use as a method of reducing farm unit costs of production.

Another fact repeatedly mentioned by fertilizer representatives is that last year's heavy yields of crops placed a heavy drain on basic plant food nutrients. Prudent farmers know such yields have robbed the soil of important elements. Also, this will be emphasized to growers by many county agents and other agricultural advisors.

U.S.D.A. agricultural scientists at Beltsville, Maryland, recently listed important plant foods lost in 1958, and gave the following priority to their replacement in the soil: Nitrogen is first, potash second and phosphorus third.

Southern Comments

A sample opinion in Georgia about the coming fertilizer season is that tonnage will reach an all-time high in that state. "Movement of this fertilizer will be earlier than 1958 and a little more evenly distributed, barring bad weather conditions," a fertilizer industry spokesman emphasizes. "At least 95% of all manufacturers believe there will be a record tonnage sold in the spring of 1959," he says.

From South Carolina comes a similar statement. An industry leader explains: "Spring sales of mixed fertilizer are expected to increase by 10 to 12% over last year. They will probably go up to 450,000 tons.

"Largest increase is expected in areas where cotton is the main crop. In heavy cotton-producing areas, manufacturers believe sales will rise 20 to 30%," he concludes.

A Kentucky-Tennessee fertilizer man estimates cotton-producing counties will experience a 15 to 20% fertilizer sales increase. "However, sales in non-cotton producing counties will be up only 4% over last spring," he predicts. "There is no pessimism about fertilizer sales being expressed by any manufacturers."

A Mississippian comments: "Cotton and rice will show increased mixed goods usage; perhaps up as much as 10%."

Southeast Is Optimistic

Farther down the Eastern Seaboard some optimistic statements are heard. One Virginia manufacturer believes fertilizer consumption may increase 10% this year due to absence of the Soil Bank.

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A North Carolina manufacturer says he estimates 20% less potatoes will be planted this year, and the acreage will be shifted to corn and other crops. "This will show an increase in the use of Nitrogen for side or top-dressing application," he declares.

Another North Carolina manufacturer estimates a 10 to 15% increase in the use of fertilizer in the Piedmont Area. A number of comments point out that fertilizer will move two to three weeks earlier than last spring, weather permitting.

Eastern Situation Different

With a different crop situation in the East, fertilizer prospects appear to be good, though not as outstanding as in the South. According to one fertilizer man, "Sales of mixed goods probably will increase this spring. The outlook in New Jersey may not be quite as bright as in Pennsylvania. Although New Jersey had a poor season last year, we still expect farmers to shoot for high yields in order to recover. Pennsylvania should find not only greater use for fertilizer, but also for higher-analysis goods, such as 10-10-10 and 8-16-16.

"New Jersey will plow down and side dress according to crop needs," he explains, "and Pennsylvania will continue to plow down and use starter fertilizer rather than side dress.

"With a large dairy industry that has fertilized at low levels in the past, but that now is awakening to the value of high fertilization, we hope for a very good spring."

A comment which summarized the general picture for the Northeast was as follows: "There is a definite trend toward use of higher-analysis fertilizers, both granular and semi-granular. This mainly is due to recommendations from college experiment stations for use of larger amounts of higher-analysis fertilizers per acre.

"The spring of 1958 was late, and with average weather conditions, it is expected that spring movement of fertilizer this year will be at least two weeks sooner. Thus fertilizer manufacturers will in all probability experience an earlier movement, but not as extremely peaked as last year."

Other Markets Analyzed

"Northeastern cash crops such as potatoes, apples, grain corn, small grains and vegetables experienced a poor year either in yield or in market price of the product," one fertilizer man points out. "This would tend to limit the volume of mixed fertilizer, but on the other hand the general dairy farmer will use more fertilizer this year than last.

"Another factor important to the Northeast," he goes on, "is the specialty market for home and garden use. This market should increase appreciably in 1959."

A New York state fertilizer man agrees with the trend toward higher-analysis granular fertilizer and believes it will increase greatly this spring. He estimates there will be a slight increase in tons of plant food sold. This is based on the opinion that cash crop vegetable and grain farmers will hold steadily or decrease only slightly their acre plantings and fertilizer use this spring, while dairy farmers will increase their fertilizer use.

In Maine a fertilizer leader notes: "There is generally a feeling of optimism about tonnage in New England, with the possible exception of Aroostook County, Maine, where potato prices have been distressing. But bright spots elsewhere offset the Aroostook situation.

"Manufacturers are becoming more aware of the dairy potential. Examples of this are found in the new higher-analysis 1-1-1 ratios and the new 3-2-2 ratios and plans built around nitrogen with mixed grades to fit.

"Tobacco in the Connecticut Valley will definitely be increased. The sale of fertilizer in bulk is probably a way that some manufacturers can increase sales. I believe sales will be as good as last year and perhaps a little better. The dairyman is our chance to grow."

Midwestern Opinions

"More tons of high-analysis fertilizer and a greater tonnage of all ratios will be sold in Indiana and Southern Ohio this spring as compared with last." This is the comment of one fertilizer representative contacted during the Nitrogen Division survey.

"Many plants have already noted an increase for the coming year," he explains, "although the bulk of the movement will come at planting time and peaking of shipments is expected to exceed last year. Almost every plant anticipates an increased tonnage over 1958 due to an acreage increase in corn."

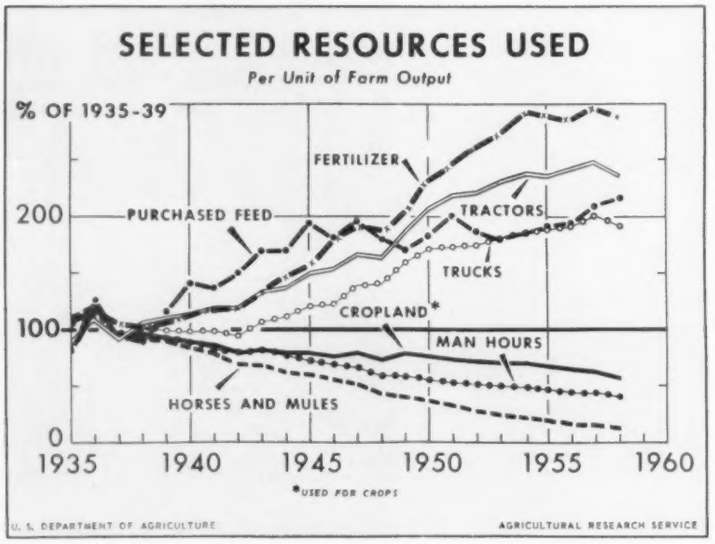
Here is another similar comment from a fertilizer spokesman: "Anticipated sales of fertilizer in the North Central part of the Midwest are good for the spring season. Crop yields and fertilizer responses were good to excellent last year. Capital for fertilizer expenditure is available."

Best Outlook Since 1954

As one Minnesota manufacturer said, "The only thing that can prevent this spring from being a boom season is the weather—either too wet or too dry."

An Iowa manufacturer added, "We are looking our best season in the eye!"

These comments reflect the optimism prevailing throughout the area. There is a definite indication from dealers that farmers will start taking delivery of fer-



tilizer earlier than in previous seasons.

"In Illinois," a fertilizer man emphasizes, "there is more hope for the coming season than any year since the drouths of 1953 and 1954. Prior to last year, mixed fertilizer tonnage had been reduced annually for four years. It sagged to its lowest spring tonnage since 1951. Last spring there was a small increase in tonnage of 40,000 tons. It is hoped the tonnage this spring will equal or even surpass the 447,000 tons sold in the spring of 1954 in Illinois," he concludes.

Prospects also are bright in Iowa. The 1958 crops sets a record in this state. Farmers are ready to buy more fertilizer than ever before, surveys indicate.

Similar views are expressed in Kansas and Nebraska where another fertilizer man again underscores the fact that manufacturers are more optimistic than any year since 1954. "The fall movement of fertilizer was the best since that season," he states. "There was considerable buying in November and December of 1958, and much of this tonnage was insecticide-fertilizer mixtures. The November vote on corn allotments makes manufacturers feel pretty certain that a lot more acres of corn will be fertilized in the spring ahead. Also, moisture of surface and subsoils is generally very adequate at this point."

Views From The West

"Throughout the Rocky Mountain area," says a fertilizer man, "more high-analysis fertilizers and straight materials will be sold. More companies will produce these products.

"The large dealers already have begun ordering carload lots. Prices are down generally, but everybody is hopeful for greater movement of everything they can sell this year."

Good Spring Season Ahead

While the outlook for fertilizer sales is brightest in the Midwest and South, as was expected, opportunities in the East and West are also promising.

In a few scattered areas where only small enthusiasm is voiced, this seems to stem from the fact that there were abundant crops which glutted the market last year and brought farmers low margins of profits, resulting in a lack of capital for fertilizer investment.

However, it is significant to note that there are no serious reports of pessimism by fertilizer men in any section of the country. Throughout the country as a whole, there is a landslide of optimistic reports. A good spring season appears to be ahead for the fertilizer industry!

Millions of children, like this little girl and her baby brother, will need increased farm production during the years ahead.

Boom in Babies Builds Huge Future Markets!

By the year 2,000, if our population grows at its present rate, we will be a nation of 388 million people, or 213 million more than today. Even by 1980, our population will be 100 million greater than today. In 1980, we will need 44½ billion quarts of milk—16 billion more than we produced in 1958. We will eat 23 billion pounds of beef, 17½ billion pounds of pork, and 33 billion pounds of flour. Our use of textile fibers will be up to 10½ billion pounds per year.

Right now, we in America have plenty of food. In 1958, we produced more than ever before, on the smallest crop acreage in 40 years. We have mounting surpluses of certain crops like wheat. But our total food production is only a few percentage points greater than our needs. By the early 1960's, many experts feel production and needs may equalize.

Less Farm Land

In the meantime, we are losing 1¼ million acres of farmland per year to homes, highways and factories. Cities, roads, railroads and factories occupy more than 115 million acres of land now—when our population is 175 million people. Add 213 million more people, and it's easy to see that much good farmland will go out of production by 1980.

True, we continue to drain swamps and plow up grassland. Several million acres of brushland are being reclaimed to grow grass to produce beef. We irrigate more land, but water supplies are limited. As population increases, less water is left for crop use. Desalting seawater and pumping it uphill to farmland is still prohibitive in cost. At $200 per acre foot, f.o.b. sea level, desalted seawater is no bargain! And cloud seeding as yet cannot be depended upon for crop expansion.

A person can eat only so much food per year. But in recent years, we have been upgrading our diets. We eat more meat, milk, eggs, vegetables, fruit and less grain and potatoes. It takes more agricultural effort to produce these prized foods. And population growth will expand our food needs in two ways.

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One is by greatly increased numbers of mouths to feed. The other is in the increased proportion of teenagers and young people in our population. Teenagers eat far more than young children or older people.

Bigger Farms

Each year we are farming our land better. But there is less new land to farm. Labor, taxes, land prices, and poor quality of marginal farm lands all limit the practical expansion of crop acreage. Farms get bigger, however, because the size of business must increase to earn a family livelihood.

Modern farm methods continue to boost crop and livestock yields from every acre. Power machinery, improved seed, weed killers, other chemicals—all boost yields per acre. Fertilizer—far above anything else—is helping to make farming more efficient. And the cost of fertilizer has remained low as compared to other things the farmer buys.

Need for Fertilizer

If our crop yields were to stay where they are, we would need 300 million more acres of cropland by 1980. We will not have the land. But we will have enough fertilizer to produce 57% more food on about our present crop acreage.

Actually, we are far from farming "as good as we know how"—with fertilizer. In 1958, a banner year for corn yields, we averaged 51 bushels per acre. Yet thousands of farmers get 100 bushels per acre, hundreds get 200 bushels per acre. How do they do it? By planting thick enough, and using enough fertilizer. Only 60% of our cornland gets any fertilizer at all. And the corn that is fertilized averages less than 300 pounds per acre. The big yields come with 500 to 1,000 pounds of fertilizer per acre.

Other large-acreage crops get less fertilizer than corn. Only 30% of our wheat and 26% of our improved pastures are fertilized. Even with high-value crops like fruit and vegetables, only 68% of the area planted gets commercial fertilizer. There is all kinds of room for expanding fertilizer tonnage.

Land Alone Not Enough

Every year farmers (and other people) keep bidding up the price of farm land. Yet every year the importance of land to food production becomes smaller. What farmers put into the land is what makes big crops and big profits. We can't afford to put a lot of labor into a crop-acre. And we don't have to. We can use more fertilizer! Fertilizer builds big yields at low cost per bushel or pound. When 30¢ to 40¢ worth of fertilizer makes an extra bushel of corn, worth $1 or more, it pays well to use a lot of fertilizer on every acre. When it costs $40 for land, labor, taxes, seed and machinery to grow a 50-bushel corn crop, and it costs $58 to grow a 100-bushel crop with fertilizer, it is easy to see that the profits lie in higher yields. We will need more food, and fertilizer can produce it at low cost for the consumer and big profits for the farmer. The selling of fertilizer is going to be a good business in the years ahead—and a service to the human race!

Prepare Now for the Spring Rush

With the big spring fertilizer season just around the corner, it's wise to get ready now to handle a large volume of orders. Then you will be set to make the most out of all your sales opportunities. Here are some helpful tips:

1. Build all the inventory you can hold to meet the spring rush. Make sure you have sufficient mixing and bagging facilities. Additional warehouse facilities in your heaviest areas will be good insurance this spring, in case of bad weather.

2. Campaign to urge dealers and farmers to take fertilizer early. Advise customers to order proper analyses in advance of the season. Fertilizer can be stored in the barn or in the ground.

3. Urge dealers to equip their operations with bulk-handling equipment and suggest they be sure to have a fast means for loading customers' orders during the rush season.

4. Make a dealer survey to determine grades and amounts that will be needed, and get an idea of what bag and bulk shipments will be required.

5. Order raw materials before you need them. This will assure you of having the right supplies, especially those materials that might become short during the spring.

6. Secure as much storage as possible for your bagged fertilizer. When the big push comes, some manufacturers bag and ship during the day, and run the plant at night. This can result in producing and shipping fertilizer that is not well-cured. Additional bag storage will help avoid this.

7. Check all your plant equipment and office supplies. Make necessary repairs well in advance of the season. A well-stocked plant with smooth-running machinery avoids costly breakdowns and tonnage-cutting slowdowns after the heavy shipping season starts.

NEWS DIGEST OF THE WEEK

Patented Acid-Resistant Bag Closure to Be Offered Fertilizer Trade Via License

ST. LOUIS, MO.—Bemis Bro. Bag Co. has been granted U.S. Patent No. 2,855,881 for an acid-resistant bag closure sewn with thread manufactured in a combination of plies of synthetic plastic materials, such as nylon or Dacron, and of cellulose fibers such as rayon or cotton. In this instance, the word "closure" means stitching or seaming the top, sides or bottom of a bag.

After tests in its laboratories and others, Bemis has recommended that such patented bag closures be sewn with thread composed of Dacron and cotton plies. Thread of this composition is produced in the company's cotton mill at Bemiston, Alabama.

The makers have adopted an automatic method of licensing users under its patent when they purchase Bemis "Golden-Ply Acid-Resistant Thread." The price of the thread as now established contains a small royalty and each cone of thread bears the following statement:

"The purchaser is licensed under U.S. Patent No. 2,855,881 for this purchase only and the price paid includes the license fee."

For the convenience of the chemical and fertilizer industries in which the patented bag closure is expected to have wide use, Bemis has adopted the policy of being willing to issue licenses under its patent to bag closers, bag manufacturers and thread manufacturers, where its thread with automatic license is not employed.

New Canadian Manager

POINTE AUX TREMBLES, QUE. —Louis-Phillips Thibodeau has been named manager of Quebec Fertilizers, Inc. here, according to an announcement by Paul Bastien, president of the firm. The new manager has served agriculture in a number of capacities in Quebec and is a graduate of the Oka Institute of Agriculture. Quebec Fertilizers, Inc., has devoted much attention to scientific use of plant food in its marketing area and has launched a widespread demonstration program in cooperation with the agricultural colleges and both federal and provincial departments of agriculture.

Mr. Thibodeau

Washington Firm Names New Officers, Predicts Progress for Future

YAKIMA, WASH.—Stockholders of Norkem Corp., Yakima, elected new officers at the firm's annual meeting in Seattle recently. R. E. Jones, Yakima, was named president; Maurice Balcom, Ellensburg, Wash., vice president; Paul Gardner, Seattle, vice president; F. A. LeSourd, Seattle, secretary; Melvin Borgersen, Seattle, treasurer; and John Wingenbach, Yakima, assistant treasurer.

Stockholders were shown charts and graphs indicating continued expansion on the part of the company. During 1958, increased sales coverage was indicated for eastern Washington as well as for parts of Oregon.

The Medford, Ore. branch of the firm began full time activities in November under the direction of Ronald James of that city.

Armour Plant Installs TVA Ammoniator

ATLANTA—The Armour Fertilizer Works here has obtained a license from the Tennessee Valley Authority for the use of process and apparatus for the ammoniation of superphosphate. This process, for which TVA holds patents, permits a fertilizer producer to use more low cost nitrogen solutions in the mixing of materials. Nearly a hundred companies have been licensed by TVA to use the process on a royalty-free basis.

Ohio Firm Elects

COLUMBUS, OHIO — Farmers Fertilizer Co. has elected B. P. Redman, Jr., president. The action was taken at a recent meeting of the firm's board of directors. The company also announced the retirement of H. E. Wood, vice president, who has been with the firm over 40 years.

FIVE-YEAR SAFETY RECORD—Production men from the St. Joseph, Mo. fertilizer plant of Consumers Cooperative Assn. were honored in a live television program recently in observance of their completion of five years of work without a lost-time accident. In the picture above are the three fertilizer men being interviewed by a representative of station KFEQ-TV, St. Joseph. They are, left to right, Macklin Wilkinson, C. P. Perkins, plant manager, and Merle Blue, director of manufacturing for consumers. As noted in the placard above the men, the plant worked for 1,554 days without a lost time accident.

PRODUCTION Man of the Month

Federal Chemical Official Supervises Firm's Output

To the Federal Chemical Co., Louisville, Ky., the production of its fertilizer materials and the general operation of its modern facilities are an unusually important part of its operations. With widespread activities in a half-dozen or more states, Sam E. Shelby, vice president for production of Federal, carries some weighty responsibilities.

However, Sam's approach to the problems at hand is usually on a sound basis. This is due not only to his many years of experience in fertilizer manufacturing, but also to his knowledge of management gained doubly through his work and a long period of enterprising study and schooling which earned him a law degree in his spare time.

Sam E. Shelby

Mr. Shelby is well-known in the fertilizer industry, having taken part in industry activities outside his immediate area of operation.

As vice president and a director of Federal, Mr. Shelby's activities are varied. He is well occupied keeping production up at the firm's six operating plants but, in addition, is very conscious of safety and good housekeeping in these plants. The plant at Louisville, for example, recently completed more than 1,500 days of operation without a lost time accident. For this and previous good records, the company has received recognition from the National Safety Council.

Sam has been with Federal Chemical since 1946 at which time he was chief engineer. Since then he became general production manager, then moved into his present position. He has been responsible for the installation of many of the material handling devices as well as general plant layout in the case of the firm's plant at Danville, Ill. This particular plant was erected from the ground up by the company.

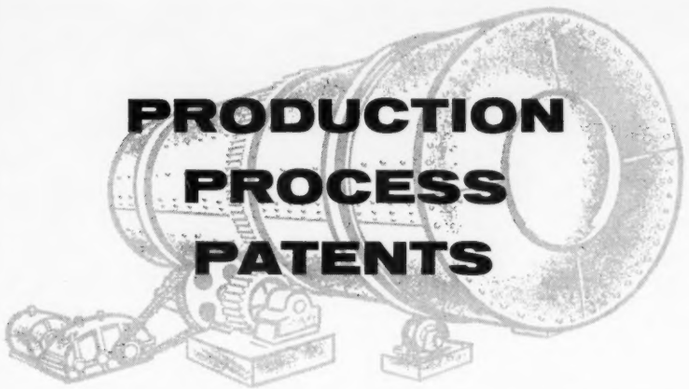
More recently, Sam personally supervised the installation of granulating equipment at four of the company's six producing plants.

He is a native of Maury County, Tenn., and was graduated from Vanderbilt University with a degree in mechanical engineering. He spent five years in the U.S. Army in World War II, seeing service in the Southwest Pacific theater, holding the rank of captain at the time of his discharge.

Sam is basically a family man. His wife, Dorothy, is also a graduate of Vanderbilt where they met, and the couple has two boys, Sam, Jr. and Gary, ages seven and three. With whatever time Mr. Shelby has after his work duties and attending to things at home, he follows sports closely and has a keen interest in politics.

Stop Aching Backs!

Do you teach the men in your plant to lift correctly and thus save unnecessary wear and tear on back muscles? The National Safety Council says that when lifting bags or other weighty objects, a man should bend his knees and squat close to the load rather than stooping with his legs straight. The back should be kept as erect as possible. With a good grip on the object being lifted, the man should raise it by straightening his legs steadily.



2,875,119

Insecticide Formulations. Patent issued Feb. 24, 1959, to Leo Trademan, Marshall A. Malina and Louis P. Wilks, Chicago, assignors to Velsicol Chemical Corp., Chicago. A stabilized insecticidal composition comprising in combination: an insect toxicant derived from hexachlorocyclopentadiene selected from the group consisting of endrin, isodrin, aldrin, dieldrin, chlordane and heptachlor; a finely divided solid carrier active in deteriorating said insect toxicant mixed therewith selected from the group consisting of kaolin clay, montmorillonite clay, attapulgite clay, diatomaceous earth and vermiculite; and between ½% and 12% by weight of the carrier of a glycol which alleviates said deterioration of the insect toxicant selected from the group consisting of ethylene glycol, propylene glycol, diethylene glycol and triethylene glycol.

2,875,120

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2,875,121

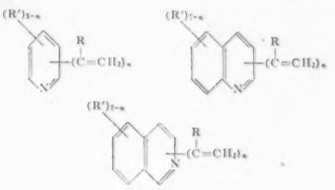
Insecticide Formulations. Patent issued Feb. 24, 1959, to Leo Trademan, Marshall A. Malina and Louis P. Wilks, Chicago, assignors to Velsicol Chemical Corp. A stabilized insecticidal composition comprising in combination: An insect toxicant derived from hexachlorocyclopentadiene selected from the group consisting of endrin, isodrin, aldrin, dieldrin, chlordane, and heptachlor; a finely divided solid carrier active in deteriorating said insect toxicant mixed therewith selected from the group consisting of kaolin clay, montmorillonite clay, attapulgite clay, diatomaceous earth and vermiculite; and between 2% and 14% by weight of the carrier of an organic compound which alleviates said deterioration of the insect toxicant selected from the group consisting of diacetone alcohol, and isopropanol.

2,875,128

Pesticide Emulsions Containing an Oxyethylated Oxypropylated Glycerine. Patent issued Feb. 24, 1959, to Willard H. Kirkpatrick, Sugar Land, and Virgil L. Seale, Houston, Texas, assignors to Visco Products Co., Houston. An oil-in-water emulsion containing oil, water and at least one toxicant component selected from the group consisting of chlorinated camphene, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane, the gamma isomer of benzene hexachloride, dieldrin, chlordane and an alkyl aryl sulfite emulsified with an emulsifying agent which is an oxyethylated-oxypropylated glycerine wherein polyoxypropylene chains are attached to the glycerine nucleus and polyoxyethylene chains are in turn attached to said polyoxypropylene chains, the terminal groups being hydroxyl groups of the polyoxyethylene chains, the oxypropylene groups forming 48% to 66% of the total oxyalkylene groups, the oxyalkylated glycerine containing about 83-126 mols of propylene oxide per mol of glycerine and further containing about 48-135 mols of ethylene oxide per mol of glycerine.

2,875,097

Parasiticides, Their Preparation and Use. Patent issued Feb. 24, 1959, to James E. Pritchard, Bartlesville, Okla., assignor to Phillips Petroleum Co. The process for the preparation of a fungicidal reaction product comprising reacting a phenol which possesses fungicidal properties with a polymer of a monomer system comprising a compound having a structure selected from the group consisting of



wherein n is an integer selected from the group consisting of 1 and 2, each R is individually selected from the group consisting of H and CH_3, and each R′ is individually selected from the group consisting of hydrogen, alkyl, nitro, alkoxy, halo, hydroxy, cyano, aryloxy, aryl, haloalkyl, al-

karyl, hydroxyaryl, not more than 12 carbon atoms being present in the total of said R′ groups.

2,874,028

Method of Producing Natural Rhombic-Shaped Ammonium Sulphate Crystals. Patent issued Feb. 17, 1959, to George C. Ponchaud, Gary, Ind., assignor to U.S. Steel Corp., Pittsburgh. A continuous process for producing crystals of ammonium sulphate which comprises continuously introducing ammonia and sulphuric acid into a saturated solution of ammonium sulphate, adding tannin to said solution in an amount sufficient to cause the production of ammonium sulphate crystals having a natural rhombic shape, and maintaining the tannin concentration in said solution by thereafter adding tannin as needed to replace that lost by hydrolysis.

2,874,029

Process of Preparing Aqua Ammonia. Patent issued Feb. 17, 1959, to Jonathan Garst, Oakland, Cal. A process of converting anhydrous ammonia to aqua ammonia of a predetermined nitrogen content by the total addition of a predetermined quantity of anhydrous ammonia to a sufficient quantity of a confined body of water to produce said aqua ammonia of predetermined nitrogen content comprising: adding said anhydrous ammonia to said water in n substantially equal increments and cooling the resulting solution prior to the addition of each successive increment of anhydrous ammonia to a sufficient extent to lower the vapor pressure thereof substantially below one atmosphere, said vapor pressure at no time exceeding one atmosphere, the number of increments n of anhydrous ammonia so added being such that the heat of formation and solution resulting from the addition of the nth or final increment to the preceding solution will not result in an increase in the vapor pressure of the final solution above one atmosphere.

2,874,036

Ammoniated Superphosphates and Process of Producing Same. Patent issued Feb. 17, 1959, to Richard C. Datin, Petersburg, Va., assignor to Allied Chemical Corp., New York. The process of minimizing reversion of citrate-soluble P_2O_5 to citrate-insoluble P_2O_5 in ammoniated superphosphates, which process comprises acidulating phosphate rock containing fluorine with from 3 to 20 equivalents of acid per mol of P_2O_5 in the phosphate rock, ammoniating the superphosphate thus produced employing from about 1.3 to about 2.9 mols of ammonia per mol of P_2O_5 over and above the amount of ammonia required to neutralize that portion of the acid employed during the acidulation which is in excess over that required to solubilize the P_2O_5 in the phosphate rock and adding a water-soluble magnesium salt to the process in amount sufficient to provide from 0.5% to 5% magnesium by weight based on the weight of solids in the superphosphate, the said magnesium salt being added to the process so that it is present during the ammoniation.

2,874,119

Corrosion-Inhibiting Compositions. Patent issued Feb. 17, 1959, to Richard C. Mansfield, Haddonfield, N.J., John G. Morrison, Philadelphia, Pa. and Claude J. Schmidle, Moorstown, N.J., assignors to Rohm & Haas Co., Philadelphia. A corrosion-inhibited aqueous composition comprising an aqueous hydrochloric acid solution containing dissolved therein, in an amount sufficient to inhibit corrosion of ferrous metal surfaces, the reaction product obtained upon heating, for at least one-half hour at a temperature of 45°-120° C., an ammonium halide of the formula RNH_3Cl, where R is a member of the class consisting of hydrogen and the methyl group, with formaldehyde and an olefin of the formula

$$ArC(=CH_2)R$$

where Ar is a member of the class consisting of phenyl tolyl, and xylyl groups, and R is a member of the class consisting of hydrogen and the methyl group, there being for each part of the olefin employed in the reaction from 1.5 to 5 parts of formaldehyde and from 1.0 to 2.5 parts of the ammonium compound.

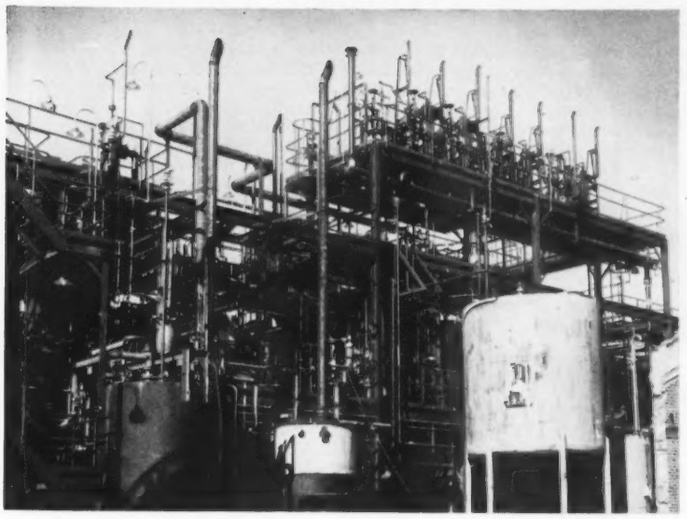
2,861,877

Treatment of Sewage Sludge. Patent issued Nov. 25, 1958, to Cecil J. Geraghty, Redwood City, and Richard R. Kennedy, Palo Alto, Cal., assignors to Modoc Peat Moss Co., San Francisco. In the treatment of sewage sludge to form a compost, the improvement which comprises placing a layer of loose porous cellulosic material over a relatively flat bottom of a shallow reservoir provided with drainage, flooding the layer in the reservoir with sewage sludge containing from about 2% to about 15% by weight of solids to form a pool of sludge in the reservoir that is several times deeper than the layer but with the layer being at least one quarter of the depth of the pool, permitting the flooded layer in a quiescent state to drain by gravity while it is exposed to the air so that liquid is removed from the pool and the solids of the sludge filter into and impregnate the layer and are also composted, the drainage being continued until the impregnated cellulosic material can be tilled without sticking appreciably to the tilling tool, thereafter tilling the drained impregnated layer in place in the reservoir, and repeating the flooding and drainage steps described above in turn of the order of four times until the layer is impregnated with about 3 to about 5 parts by weight of sewage sludge for each part by weight of cellulosic material.

2,861,878

Manufacture of Complex Fertilizers. Patent issued Nov. 25, 1958, to Bernard Bigot, Rouen, France, assignor to Societe Anonyme des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey, Paris, France. A process of making fertilizers from phosphates of fertilizer grade, ammonia and nitric acid, containing nitrogen in nitrate and in ammonium radicals, and containing phosphoric acid soluble in ammonium citrate, in which process lime phosphate is attacked by nitric acid, the product so formed is attacked by ammonia, and the resultant product is simultaneously reacted with ammonia and carbon dioxide, the step of carrying out the ammonia-carbon dioxide reaction in the presence of a quantity, on the order of .05 to 2% by weight of the phosphate treated, of at least one water soluble alkali metal salt of a mineral polyacid.

Parathion-Producing Plant Operates Under Conditions of Optimum Efficiency, Safety



OPERATING SIDE — Monsanto's parathion plant at Anniston, Ala., is said to be the largest in existence for making this type of product.

ONE OF THE most modern basic pesticide manufacturing plants in the world is Monsanto Chemical Co.'s methyl parathion facility at Anniston, Ala. Designed for economical output, ease of maintenance and for maximum safety, the unit is reported to have more than proved its worth in producing for the company.

Despite its sturdy construction, the plant was designed and erected from the ground up within an unusually brief time. Following an explosion and fire at the company's Nitro, W. Va., parathion unit in April, 1957, Monsanto decided to erect a new facility at Anniston. By January, 1958, the plant was being tested, and on the 13th of that month, it went on stream with raw materials. Its operation during the intervening months has been more than satisfactory, company spokesmen indicate.

In planning the facility, considerations concerning efficiency, economical output and excellence of product naturally took high priority, but the safety factor was also among the top items of interest. Here are some of the features included in the plant's equipment:

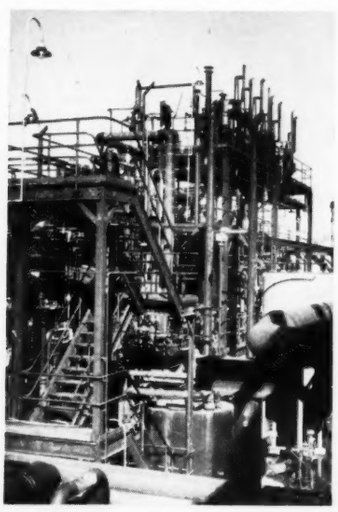
Adequate means for temperature measurement and control. Interlock systems and instruments are relied upon to prevent hazards in the plant and to keep temperature under positive control at all times.

All temperature-registering instruments are of the "fail-safe" type which in the case of malfunction sends the gauge to the high point instead of dropping it back to zero. This in turn activates automatic cooling procedures.

Monsanto designers have made sure of positive temperature control through an interlock system throughout the reaction section of the plant. This system will automatically override manual control should temperatures rise beyond a preset limit, regardless of the reason.

The main function of the interlock system is to control reactor jacket temperatures. The system also controls pressures in vessels, feeds, and agitators as well as pressures in other areas where trouble might originate. Experience gained in operation of the former Nitro plant provided a wealth of information on how the Anniston plant should be constructed for optimum production efficiency.

The plant was designed to have a minimum of manual handling op-



PARATHION MANUFACTURE — View of unit for making methyl parathion at Monsanto's plant at Anniston, Ala. The plant was erected in record time following destruction of its predecessor at Nitro, W. Va.

erations and at the same time provide a convenient layout for operators of the plant. Materials possessing some toxic properties and thus difficult to handle are received in specially-designed tote bins that, after being emptied, may be shipped back to the manufacturing plant at East St. Louis. The material, such as phosphorus pentasulfide, is dumped into a conveyor hopper which then carries the ingredient to its designated reactors and on through the process. At no time is it necessary for employees to touch the material, nor is it at any time exposed in open containers.

As learned from the experience at Nitro, safety design of the plant structure is of No. 1 importance. Consequently, the new plant represents unusual thought and effort to provide maximum protection to personnel and to the plant itself, should explosion, fire, or other mishap come about.

Around each reactor, processing intermediates that might be unstable, are reactor cubicles which provide a safe side for the installation of pumps, controls, valve extensions. Windows in the cubicle walls permit operators to observe equipment in each area where necessary. Arrangements of mirrors enable operators to "look around corners" to check on sight glasses and gauges in lines behind the walls.

An added precaution is seen in the dump-trench system which makes it possible for operators to dump the contents of reactors into the water-filled trench to cool and partly neutralize the intermediates. In addition to this safeguard, each cubicle is equipped with heat detectors and nozzles of the plant deluge system.

In the operation of a plant like this parathion-producing unit, the disposal of potentially toxic or corrosive waste is a problem. How does the plant rid itself of such wastes?

In the case of parathion, it reacts quickly with common sodium carbonate to change the parathion into nontoxic substance. Sodium carbonate also neutralizes many of the intermediates that may be toxic and unstable. By-product gases from the reaction products are burned in an incinerator with much excess air, if the reaction products are volatile enough to ignite.

Liquid wastes not containing sewage pass through a trench containing limestone to neutralize by-product hydrochloric acid. Concrete-lined mixing tanks are located at the end of the trench. Here, caustic is added when necessary to neutralize any parathion that might be present at that time.

The effluent water then goes to dual holding tanks each with a 16-hr. holding time. In its final form, the effluent is a water solution of calcium chloride which is handled by the Anniston city sewage plant.

HOUSEKEEPING

(Continued from page 4)

quite often Romex cable stapled directly to the wood timbers has been used for light circuits. We have found instances where from an existing properly run light circuit an extension has been added by the maintenance crew with Romex cable passing from one timber to another with the cable stapled to each of the timbers. The vibration between the two timbers can easily cause the staple to break through the insulation resulting in an arcing between the two wires directly against the combustible timbers.

One example of this was noted on an inspection trip some time back right at the head of an elevator on a roofing rafter immediately beneath the roof sheathing. The insulation was worn through completely to one wire and it was very thin on the other wire. In this out-of-the-way location with little possibility of air currents, there was an ideal setting for a destructive fire which would have been listed "cause unknown."

Fire extinguishers are handy items to have around when a blaze starts. If used in the early stages of the fire, they can prevent a serious loss. But they are not much good after a fire has had time to get a good start. Where are those fire extinguishers? Where housekeeping is bad, it is quite generally true that the fire extinguishers are neglected. They will be found almost anywhere but in the proper place—stuck around the corner behind a post, lying on the floor, over behind a stack of bagged fertilizer, just any old place, it doesn't make much difference.

There are any number of similar instances which we could all recall if it has been our responsibility to inspect the premises of fertilizer plants. They are small items but they all add up to tremendous hazards which vitally affect the safety of the employees and the final cost of our production.

Where must the emphasis start? It will never start with the laborer and go up through the foreman to the superintendent. It must start in the superintendent's office and go from there to the foreman and then directly to the rank and file of labor. How does the superintendent's office look? A broken chair here. Three or four frayed extension cords to clocks, desk lamp, etc., all originating from a drop cord in the center of the ceiling. Has the plaster fallen from a large section of the side wall and is there an assortment of repair parts and record books piled over in the corner? Is there an accumulation of years of dirt and dust on the walls and on top of the cabinets? The whole quality of the housekeeping program must be set by the superintendent and his surroundings.

Agrico Names Manager Of Buffalo Plant

BUFFALO, N.Y.—Dale J. Boyer has been named manager of the American Agricultural Chemical Co. plant here. Mr. Boyer, former manager of the Agrico plant in Three Rivers, N.Y., succeeds Clell R. Clemons, who has been named manager of the Agrico Mid-Southern Sales Division, with headquarters in Greensboro, N.C.

The company also announces it has installed in the Buffalo plant a new continuous ammoniating unit as part of a major shift in the plant's output from pulverized to granulated fertilizers. The plant has a total of 130 regular employees. During the peak season, April 1-June 1, it will employ about 300, Mr. Boyer declared.

NEW PLANT IN PRODUCTION—California Ammonia Co. plant at Lathrop now producing in excess of its rated capacity of 117 tons a day anhydrous ammonia. Construction began in June, 1958, and first output was in January.

N Plant Completed

LATHROP, CAL. — The new anhydrous ammonia plant of California Ammonia Co. has begun actual production at the rate in excess of its design capacity of 117 tons daily, according to Lowell W. Berry, chairman of the board. He reported that with small adjustment, the plant could step up its output by 15 to 20 tons a day and this figure is expected to be reached "in the very near future."

Rated production, Mr. Berry said, was realized in just eight months after construction was first initiated in June, 1958. Production has been increasing steadily since the first commercial quality of ammonia was put out in January.

Heavy rains during the spring of 1958 delayed early construction, but once under way later in the summer, erection of the plant proceeded without interruption.

V-C Reports 22 Plants With High Safety Records

RICHMOND, VA. — Improvement in the safety records of Virginia-Carolina Chemical Corp. fertilizer plants has been announced by Wm. B. Yuhase, engineer, insurance department of V-C. Of the firm's 35 plants, 22 have completed a year or more without a lost time accident. The plant at North Little Rock, Ark., has a record of 2,430 days, with the other 21 accident-free plants ranging down to 368 days.

During the 1958-59 fiscal year, accidents in the V-C fertilizer division numbered 97 as compared to 106 for the preceding year, Mr. Yuhase reports. He adds that the company's efforts to step up its safety record are showing results.

FMC Acquires Sunland Industries Stock

SAN JOSE, CAL. — Purchase of Sunland Industries, Inc., Fresno, producer of agricultural chemicals and seeds, by Food Machinery and Chemical Corp. has been announced jointly by Paul L. Davies, FMC chairman, and Beverly H. Jones, chairman of Sunland. The acquisition, subject to obtaining regulatory approval, is being made through exchange of an undisclosed number of shares of FMC common stock for all of the outstanding stock of Sunland.

Sunland Industries has been associated with California agriculture for over 30 years as a producer of insecticides, fertilizers, and seeds for Central and Northern California agricultural areas. FMC, through its Niagara Chemical division, is leading producer of agricultural chemicals.

According to officials of both companies, the merger of interests and activities between Sunland and Niagara's western operations headquartered at Richmond, Cal., will provide benefits for both agricultural chemical operations. Sunland will benefit from FMC's extensive research, production, and basic chemical resources, while Niagara will enlarge its ability to serve the California pesticide market.

New Yugoslav Fertilizer Production Unit Planned

BELGRADE, YUGOSLAVIA — An Italian firm, Montecatini & Ansaldo, has signed a contract here with the Yugoslav Ruvnap Co. for construction of a nitrogen fertilizer plant at Lukavaz in Bosnia. Construction work was to get under way immediately. Cost of the new facility was set at $3.5 million.

The new unit will produce 100 metric tons of anhydrous ammonia daily, using hydrogen from an already existing coke oven plant. In addition, the plant will turn out 340 metric tons of nitrochalk containing 20.5% N. The Fauser-Montecatini process will be utilized in these operations, reports say.

TAKE IT EASY IN THE PLANT!

More accidental injuries result from falls than from any other single cause except traffic accidents. Most falls in the plant can be avoided if aisles, stairways, and walkways are kept neat and orderly. Spilled liquids should be wiped up immediately and makeshift ladders should be replaced by strong safe ones. Another admonition suggested by the National Safety Council: just take it easy and don't rush about unnecessarily.

What's New?

Additional information is available about new products, new services, and literature described in this department. Circle the numbers of items on which you desire more information, fill in your name, your job title, your company's name and address on one of the cards. Then clip it out of the page and mail. No postage is necessary.

No. 9034—Pesticide Solvent

Full information is available to pesticide formulators on a xylene-based solvent which its makers, Eastern States Petroleum & Chemical Corp., state is registered for labeling on pesticidal products. The material, known as "Espesol 5" is described as being water-white and possessing absolute uniformity. It has been passed by college experiment stations, the makers state, and possesses a fast evaporation rate and a narrow boiling range. A booklet describing the material's properties and characteristics as an insecticide solvent is available by checking No. 9034 on the coupon.

No. 9033—Insoluble Nitrogen

E. I. du Pont de Nemours & Co., Inc., offers explanatory literature on its long-feeding insoluble nitrogen product "UAL-37" available to fertilizer manufacturers. According to DuPont, the material furnishes nitrogen in three forms: ammonia, soluble organic (urea) and insoluble organic. The makers say the material has a conditioning effect in mixed goods; is safe in granulation processing; suitable for either batch or continuous mixing; minimizes caking, segregation and dusting and is non-corrosive. Check No. 9033 on the coupon.

No. 9030—Moisture Sealer for In-Plant Use

The Multiwall Division of Hudson Pulp & Paper Corp. offers information on its new moisture vapor transmission sealer for bags containing hygroscopic or acid materials. The new process, it says, makes practical the use of multiwall bags for shipping materials formerly shipped in drums. Sidewall protection has been effected by use of barrier sheets, but the problem of insuring positive end-seal has been troublesome to the industry, the bag-makers point out.

According to the Hudson firm, the sealer fits into the filling line and operates uninterruptedly at the regular line speed of 32-48 ft. a minute. It is positioned on the line immediately following the sewing head and picks up automatically at the same height as the sewer, they state. For full information on the moisture sealer, check No. 9030 on the card.

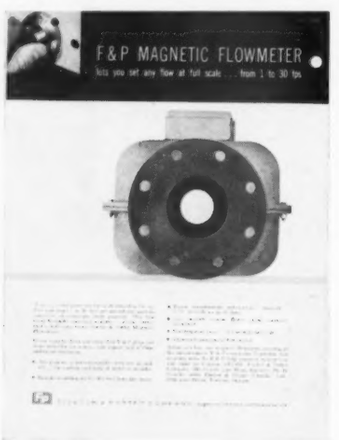
No. 9032—Hydraulic Scoop

Fabricated Metals, Inc., offers literature describing its new hydraulic scoop to enable fertilizer manufacturers to convert forklift trucks into front-end loaders. The scoop, according to its makers, may be connected or disconnected with two hydraulic quick-couplers and two set screws in less than five minutes. The new device fits any standard forklift truck and holds approximately 13 cu. ft. of material. It is self-emptying. The device will raise a load to the forklift's

maximum height. The scraping edge of the scoop, its makers say, is made of high-strength "Cor-ten" steel. Full information is available by checking No. 9032 on the coupon.

No. 9036—Magnetic Flowmeter

Fischer & Porter Co. offers full information on its magnetic flowmeter suitable for recording flow rates from 1 to 30 ft. a second. Feature of the device, the makers say, is a dial which can be turned to various settings for regulating flow rate. The



makers also state that remote recordings up to 2,000 ft. from the meter may be made; that power requirements are reduced; that reverse flows may be measured without auxiliary equipment; and that the meter offers fast response time. Full details about the flowmeter are available by checking No. 9036 on the card.

No. 9028—Plant Construction Bulletin

Badger Manufacturing Co. has prepared a four-page bulletin describing construction of concentration plants for manufacture of nitric acid without the use of sulfuric acid and without normal corrosion problems. The bulletin gives a case history of how the Hercules Powder Co. used this process in its facilities for the manufacture of nitric acid. Photographs and flow diagrams illustrate the descriptive copy contained in the bulletin. Check No. 9028 on the coupon.

No. 9029—Fly Repellent Offered to Formulators

Fairfield Chemicals, Food Machinery & Chemical Corp., is making available to pesticide formulators Crag fly repellent for products to control biting flies, horn flies, horse flies, stable flies, mosquitoes and other pests on animals. Fairfield will make the repellent available to formulators either alone or in combination with Pyrenone, the firm's piperonyl butoxide and pyrethrins concentrate, it states. The repellent can be included in many formulae with complete safety, the makers say. For complete information about the availability and other details regarding the material, check No. 9029 on the card.

No. 9037—Dust Collector Book

A 24-page illustrated application handbook entitled, "Industry Relies on Dustube Collectors for Efficient Dust and Fume Control" is offered by Wheelabrator Corp. This book describes a wide range of industrial dust and fume producing processes that can be controlled with cloth or glass bag-type dust collectors.

Operating principles and the reasons for low-cost operation of Dustube Collectors are fully illustrated and explained. In addition to this, fourteen separate illustrated sections show how these dust collectors are currently being successfully used in a wide variety of applications.

Difficult "hot and corrosive" applications such as granular fertilizer driers and chemical fume collection are featured. The synthetic and glass filtering bags designed to resist the high temperatures and corrosive action of many of these applications are also briefly described and custom-built baghouses illustrated. Check No. 9037 on the coupon.

No. 9038—Underweight, Overweight Indicator

Richardson Scale Co. offers descriptive information on its panel-mounted off-weight indicator for use in automatic proportioning systems. The instrument provides visual indication of the number of off-weight graduations for each ingredient weighed by the system. According to the makers, this reading makes it possible to correct any trend toward either underweighing or overweighing before the actual limit of tolerance is reached. Easy adjustments of tolerances may be made by turning a dial, the makers say. Check No. 9038 on the coupon.

No. 9031—Pressure-Reducing Valve

Literature describing in detail thermo-jacketed regulators is offered by the Jordan Corporation, division of OPW Corp. The valve is said to feature tight shut-off with sliding gate

regulators; close control, straight-through flow of liquid. The valve is said to have unusual sensitivity and extra long service life. A bulletin describing various sizes available, pressure ratings, and schematic drawings of the apparatus is available by checking No. 9031 on the card.

No. 9035—Electro-Matic Shovel Device

A data sheet giving specifications and general information on a new Electro-Matic shovel has been made

Send me information on the items marked:

☐ No. 9027—Bag Closure	☐ No. 9035—Shovel Device
☐ No. 9028—Construction Bulletin	☐ No. 9036—Flowmeter
☐ No. 9029—Fly Repellent	☐ No. 9037—Dust Collector
☐ No. 9030—Moisture Sealer	☐ No. 9038—Weight Indicator
☐ No. 9031—Pressure Reducer	☐ No. 9039—Drum Up-Ender
☐ No. 9032—Hydraulic Scoop	☐ No. 9040—Wetting Agent
☐ No. 9033—Insoluble Nitrogen	☐ No. 9041—Conveyor Belt
☐ No. 9034—Pesticide Solvents	☐ No. 9042—Herbicide

NAME .....

POSITION ..... ☐ Fertilizer Mfr. ☐ Pesticide Mfr.

COMPANY ..... ☐ Both ☐ Other

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available by the Munson Mill Machinery Co. The shovel is new in the traditional line of mill machinery manufactured by Munson.

The data sheet states that the new shovel greatly reduces the time of unloading freight cars. The Electro-Matic shovel, the fact sheet indicates, is designed for high speed emptying of bulk cargo from freight cars, reducing manual effort to the minimum

of guiding the scoop and positioning it behind the material to be moved.

Power is controlled by means of a push button located on the shovel handle. This serves as a "dead man's" control since positive pressure on the button is necessary. The shovel can be stopped or started, at will, anywhere within range of the cable length, the makers say. For a copy of the data sheet, check No. 9035 on the card.

No. 9039—Drum Up-Ender

Lewis-Shepard Products, Inc., offers information on its attachment which

may be put on fork trucks to transport and dump metal or fibre drums. The device not only handles barrels of this type through clamping pressure, but also dumps their contents by hydraulic tilting action, the company says. Objects handled can vary from 18" to 26" in diameter and may be tilted up to 180° forward for dumping. All operations mentioned are controlled by the driver as he is seated. Check No. 9039 on coupon.

No. 9042—Herbicide

Technical information on its preemergent herbicidal product, "Arsan" is available to the pesticide field by Ansul Chemical Co., Marinette, Wis. The material, cacodylic acid, an organic arsenical, has shown herbicidal activity, the company says. Its physical properties include solubility in water and lower alcohols, but insoluble in ethyl ether. Arsenic content is 54.3%, it is colorless and odorless in pure form. The makers point out that technical grade will contain 55% cacodylic acid; about 40% sodium chloride and 4% water. Trivalent arsenic will be approximately 1%. Check No. 9042 on the coupon for further details.

No. 9040—Wetting Agent

A data bulletin on its product, "Agriwet 9086," wetting agent designed for the agricultural chemical field is offered by Nopco Chemical Co. The makers state that the new product is particularly suited for agricultural formulators of wetting powders. "It is a specialty product intended solely to meet the needs of the toxicant formulators," Nopco says. Check No. 9040 on the coupon.

No. 9041—Conveyor Belt Catalog

A new 88-page catalog showing its complete line of belt conveyors and accessories has been published by Continental Gin Co. The line includes heavy duty and standard roller bearing and precision ball bearing idlers. Fully illustrated, the new catalog presents also comprehensive engineering data. Condensed and simplified information for selection of belt conveyors and related equipment is also presented. Check No. 9041 on coupon.

No. 9027—Acid-Resistant Bag Closure

Bemis Bro. Bag Co. offers complete information on its new patented acid-resistant bag closure for the fertilizer industry. An automatic method of licensing users under the patent has been arranged. Full information may be obtained on details by checking No. 9027 on the card.

PRODUCTION EDITION

Editorial

A FEASIBLE PLAN? . . .

Development of Code System to Identify Bagged Fertilizer Suggested to Industry

WOULD A CODE SYSTEM for identification of fertilizers be of benefit to the industry? Would it be feasible? Would it give satisfactory returns for the effort put forth?

These are questions which fertilizer manufacturers have been mulling over for some time, with a few producers taking the step and using some type of coding the plant food material as produced, when put in the bin and when bagged. Such a system is already being used widely and successfully by the pesticide industry.

So far as the fertilizer industry is concerned, the National Plant Food Institute's committee on chemical control has been giving this concept much consideration. So have the state control chemists, with the latter group responding favorably to the idea as might be expected.

The subject was discussed at the conference on chemical control problems held at the Shoreham Hotel, Washington, last fall, with Drs. H. L. Marshall, Olin Mathieson Chemical Corp., Baltimore, and Vincent Sauchelli, National Plant Food Institute, Washington, presenting some comment on the situation.

"We believe that putting a code mark on the fertilizer bag is practical and that the procedure should be adopted by fertilizer manufacturers," they said in a joint report. "The system can be kept simple and gives the responsible person an easily accessible history of the operation, since one has a fairly complete history of the fertilizer from the plant to the consumer. Such information can prove to be very useful if it is necessary to discuss it with state control officials. The information can be useful to the company control laboratory and could point up changes which occur in a fertilizer from factors of aging and transportation."

Purpose of such a system, of course, would include a means to check uniformity of sampling by both the producer and the control official through coding at the time the fertilizer is bagged. How uniform the material is throughout would be disclosed by analysis of samples of the same fertilizer made identifiable by the code number.

A simplified procedure for coding has been suggested by Dr. Marshall, although he indicates that any operator may modify it or devise a procedure which might fit in better with his own special needs. A suggested form is shown here with blank space where information might be filled in by the fertilizer manufacturer and copies maintained for future reference.

Actually, the value of a coding system depends upon what the code actually identifies. Because of the industry's methods of manufacturing and stockpiling for curing, it is next to impossible to segregate for identification, each batch as it is made. To attempt this type of record-keeping would necessitate great expansion in storage facilities and other costs too great to consider seriously.

Thus, it would seem feasible to code fertilizers at the time of bagging. This would assist manufacturers in comparing analytical results on fertilizers sampled when being bagged and the same materials upon being sampled by control officials in the field. It would also identify the date on which the fertilizer was bagged if the operator

SUGGESTED MIX-RUNG DATA SHEET

GRADE: _____ MAIS _____ PLANT: _____ COMPANY: _____

DATE	PLACE WHERE SAMPLE TAKEN	SAMPLER - LOCATION	N_2O	P_2	P_2O_5 WATER	P_2O_5 C.I.	P_2O_5 AVAIL.	K_2O	BAG CODE
	Batch mass								
	Bin								
	Bagging								
	Bagging								
	Bagging								
	Field								
	Field								
	Field								
	Field								
	Field								

wished to include this information on the form.

Naturally, the question of "would it be worth the bother?" comes up and this is a legitimate consideration. There would be some expense, too, and at this time no added cost is regarded with enthusiasm by fertilizer people.

At the same time, the idea does seem to have merit for future consideration.

Ratio: 1 to 4,000

THAT THE production man in pesticide plants across the country is an important gent is acknowledged by the U.S. Department of Agriculture which in a report to Congress not long ago made this observation:

One man in a 2,4-D plant can contribute more to weed control than can four thousand field hands using hoes.

This confirms the fact that those having to do with the production of herbicides are important people. If one multiplies by 4,000 the number of men currently busy in herbicide plants, it is not difficult to visualize a vast army of hoe-wielders digging up a lot of dirt, but accomplishing little in the way of permanent weed control.

Chemical weed killers have more than proved their worth. So have the people responsible for the output of these materials.

Croplife's Home Office

Croplife
PRODUCTION EDITION

BPA — *Member of Business Publications Audit*

NBP — *Member of National Business Publications*

CROPLIFE is a controlled circulation journal published weekly. Weekly distribution of each issue is made to the fertilizer manufacturers, pesticide formulators and basic chemical manufacturers. In addition, the dealer-distributor-farm adviser segment of the agricultural chemical industry is covered on a regional (crop area) basis with a mailing schedule which covers consecutively, one each week, three geographic regions (South, Midwest and West) of the U.S. On the fourth week, production personnel in fertilizer manufacturing and pesticide formulating plants throughout the U.S. are covered in depth. To those not eligible for this controlled distribution, Croplife's subscription rate is $5 for one year ($8 a year outside the U.S.). Single copy price 25¢.

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Industry Meetings

Feb. 24-25 — Alabama Pest Control Conference, Alabama Polytechnic Institute, W. G. Eden, Secretary-Treasurer, Alabama Association for Control of Economic Pests, Alabama Polytechnic Institute, Auburn, Ala.

March 4-5—Annual Weed and Insect Conference, Fonner Park, Grand Island, Neb.

March 17 — Western Agricultural Chemicals Assn. spring meeting, Hotel Miramar, Santa Barbara, Cal.; C. O. Barnard, executive secretary.

March 18-19—Water and Air Pollution Abatement Conference, Netherland Hilton Hotel, Cincinnati, Ohio. Sponsor: Manufacturing Chemists' Assn.

April 29-30—Symposium on transportation, regulation and packaging of chemical products, sponsored by Manufacturing Chemists Assn., Engineering and Scientific Center, Cleveland, Ohio.

June 4—Executive Committee meeting, Fertilizer Section, National Safety Council, Roanoke Hotel, Roanoke, Va.

June 9-10—Seventeenth Annual Convention of the Association of Southern Feed and Fertilizer Control Officials, Velda Rose Motel, Hot Springs, Ark.; Maurice Rowe, Virginia Department of Agriculture, 1122 State Office Bldg., Richmond 19, Va.

June 14-17—National Plant Food Institute, Annual Convention, the Greenbrier, White Sulphur Springs, W. Va.

July 7-9 — Pacific Northwest Plant Food Assn., 10th Annual Regional Fertilizer Conference, Tacoma, Wash.

Oct. 21-23—National Agricultural Chemicals Assn. 26th annual meeting, French Lick-Sheraton Hotel, French Lick, Ind.

Nov. 4-6—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D.C.; Dr. Vincent Sauchelli, National Plant Food Institute, chairman.

CALENDAR FOR 1959-60

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Delaware Firm Files Incorporation Charter

DOVER, DEL.—Molecular and Agricultural Chemical Corp. filed a charter of incorporation with the corporation department of the Secretary of State's office here. Authorized capital stock of the firm is $1,000,000 and 10,000 shares of stock, no par value. Colonial Charter Co., 927 Market St., Wilmington, is serving as the principal office.

INDEX OF ADVERTISERS

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PLANT

(Continued from page 9)

cost for units which size 180,000 lb. of corrosive material daily.

"Mixer seals and buckets need intermittent replacement, but this, too, is understandable, since ammonia is introduced directly into the mixer during the blending of the raw materials," he says. Despite the corrosive nature of its work, Dayton officials report that the inner drum of the mixer, as well as the seals and buckets, have not needed replacement.

Thus, the plant has been operating at top efficiency since it was put on-stream in 1952. It has, since that time, produced about a hundred tons a day of plant food products for its customers.

Chemical Employment Declines in Delaware

WILMINGTON, DEL. — Employment in chemical manufacturing declined in Delaware during December. The new level was estimated at 23,300 as compared with 23,500 in November, according to the monthly report of the Delaware Unemployment Compensation Commission.

The figure remained below December a year ago when the number of workers was 24,300.

Average weekly earnings of the production worker increased between November and December from $105.63 to $109.31. A decrease was noted in average hourly earnings, $2.57 in November and $2.56 in December, and a longer work week from 41.1 hours to 42.7.

Classified Ads

Classified advertisements accepted until Tuesday each week for the issue of the following Monday.

Rates: 15c per word; minimum charge $2.25. Situations wanted, 10c a word; $1.50 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 20c per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Advertisements of new machinery, products and services accepted for insertion at minimum rate of $10 per column inch.

All Want Ads cash with order.

HELP WANTED

MONSANTO IS SEEKING EXPERIENCED (3-10 years) fertilizer salesman for Illinois-Wisconsin-Iowa area. Starting salary commensurate with experience, plus car and expenses. Send all replies in confidence to William R. Hayes, Monsanto Chemical Co., St. Louis, Mo.

FERTILIZER SALES MANAGER — Established multi-plant fertilizer company, central states area, wishes to employ man 30 to 45 who has fertilizer sales experience for position of plant sales manager. Send background resume with recent photograph. All information confidential. Address Ad No. 4501, Croplife, Minneapolis 40, Minn.

MISCELLANEOUS

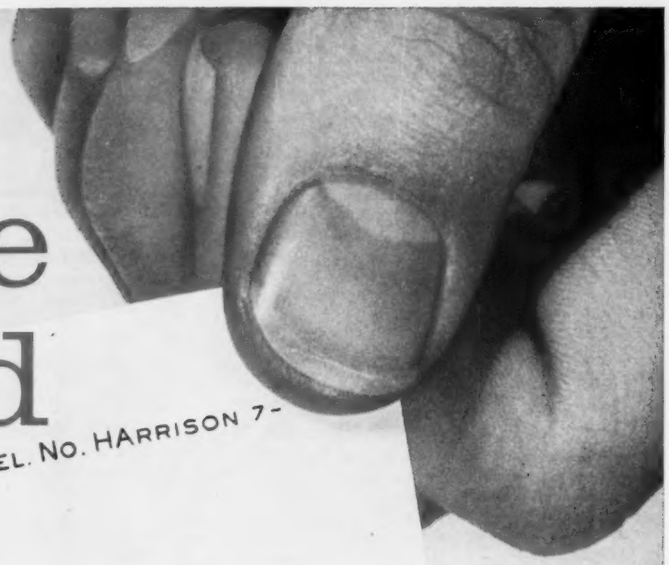
BRUSH AND WEED KILLER

KILL SUBMERSED water weeds which foul up motor propellers, tangle fishing gear and choke irrigation ditches with R-H Granular Weed Rhap. Inexpensive, easy to use, sure results. For details write Reasor-Hill Corporation, Box 36CL, Jacksonville, Ark.

KILL BRUSH at low cost with amazing R-H Brush Rhap. Will not injure grasses, grains, cattle, or other animals. See your dealer, or write Reasor-Hill Corporation, Box 36CL, Jacksonville, Ark.

Use Want Ads for Results

Welcome card



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STANDARD

G. W. DAY

NITROGEN PRODUCTS
REPRESENTATIVE

STANDARD OIL COMPANY
910 SOUTH MICHIGAN AVENUE
CHICAGO 5, ILLINOIS

to buyers of

Anhydrous Ammonia and Nitrogen Solutions

A welcome card? Yes, indeed. Here's why:

1. This card is presented by a man from a company that backs up its salesmen's promises for delivery and for products that meet a customer's specifications.

2. The customer doing business with Standard Oil knows he is buying from a company with an established reputation . . . a company he knows will give him fair treatment, service and product quality.

3. Standard's modern Ammonia and Nitrogen Solutions plant is located in the heart of the country's largest rail- and truck-shipping area. To a customer this means fast, sure deliveries . . . deliveries that can be easily controlled because routes are direct and distances short.

A modern plant capable of producing Ammonia and Nitrogen Solutions on specification. A supplier who knows a customer's requirements *and delivers*. These add up to service a Midwest buyer of Ammonia and Nitrogen Solutions can depend upon. Would you like a Standard Oil man to call on you? Write, wire or telephone Nitrogen Products Department, **Standard Oil Company, 910 South Michigan Avenue, Chicago 5, Illinois.**

You expect more from STANDARD and get it!